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Electrical World

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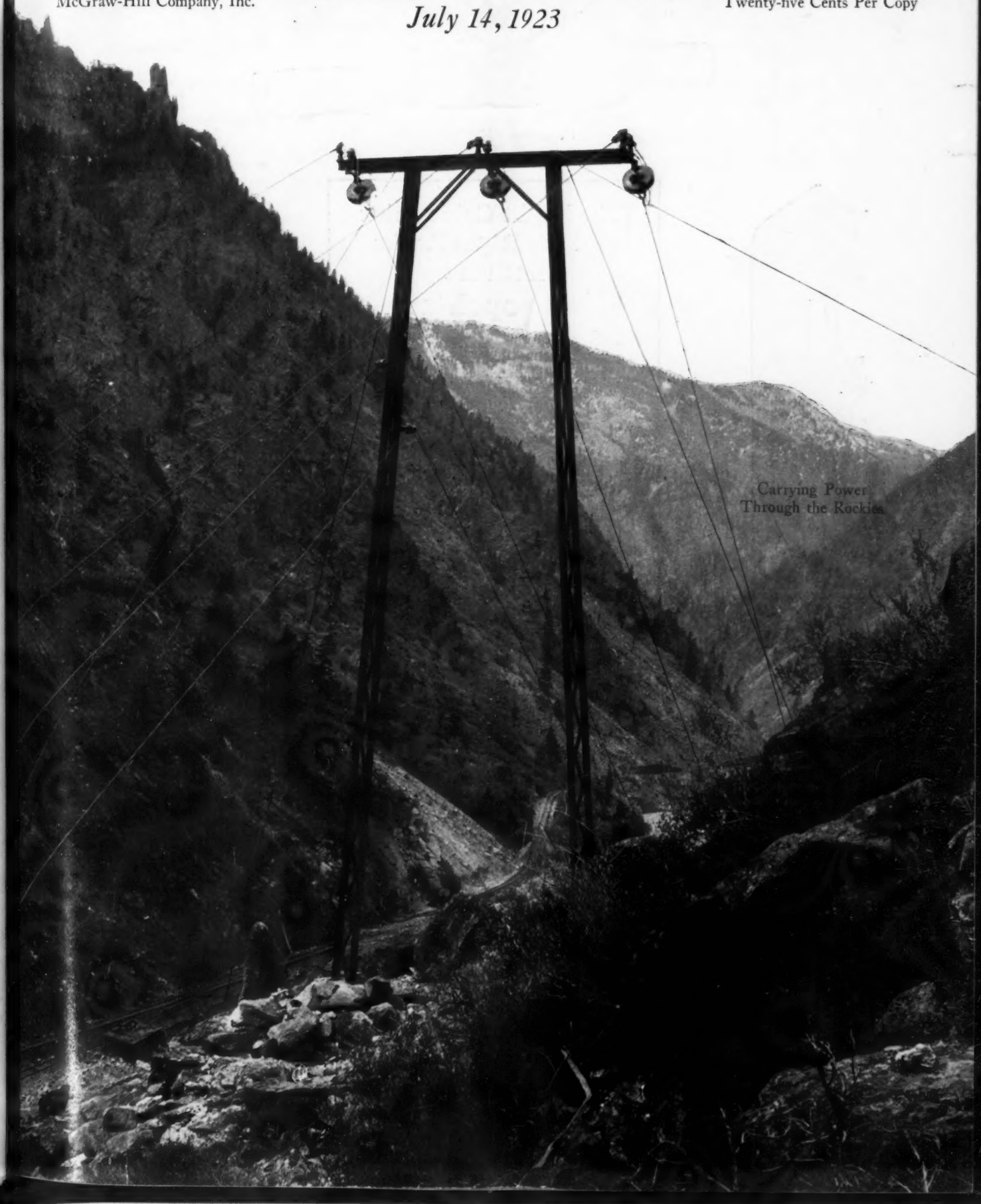

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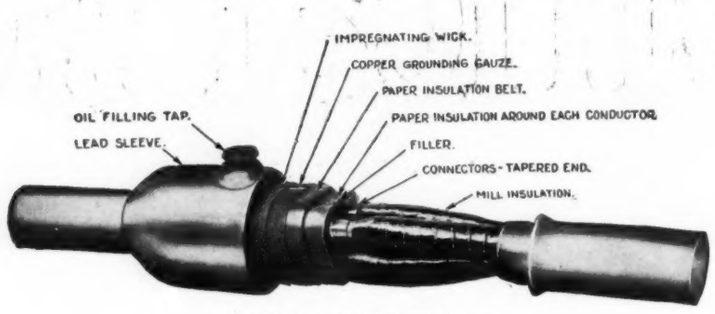

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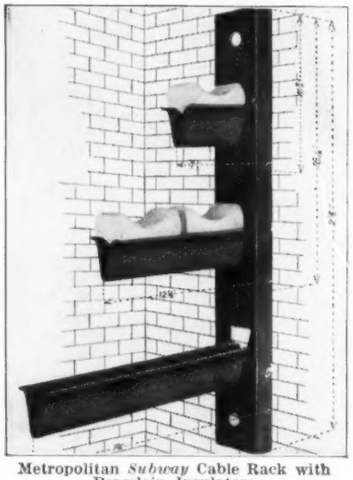

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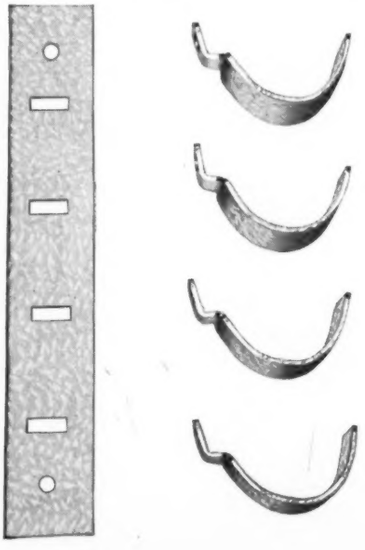

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Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

Published by McGraw-Hill Company, Inc.

W. H. ONKEN, JR. Editor — HAROLD V. BOZELL Editor

Volume 82 — New York, Saturday, July 14, 1923 — *Number* 2

Selling the Public to the Utility

MEN of the central-station industry are apt to overlook the fact that there are two sides to the much-discussed problem of public relations. The industry must interpret and "sell" itself to the public — yes; but it is equally important that the public be interpreted and "sold" to the industry. There are two parties to this partnership. Yet most that is heard within the industry's ranks is of the *public's* lack of understanding. Now, how about the central station's own viewpoint—taken in the mass?

M. S. Sloan, president of the Brooklyn Edison Company, talked to the Commercial Section of the Empire State Gas and Electric Association the other day along this line. In making the point that it is just as much the duty of the sales department to "sell" the industry to the public as to sell appliances to individual customers, he said that the commercial men of the utilities must awaken their executives to the need for greater expenditures for advertising — an appropriation of at least 1 per cent of each company's gross sales, he believes, should be spent in telling the story. In short, they must interpret to their own people the vital need that the company's representatives themselves understand the public as an element in the business of electric service and get into a proper relationship with it.

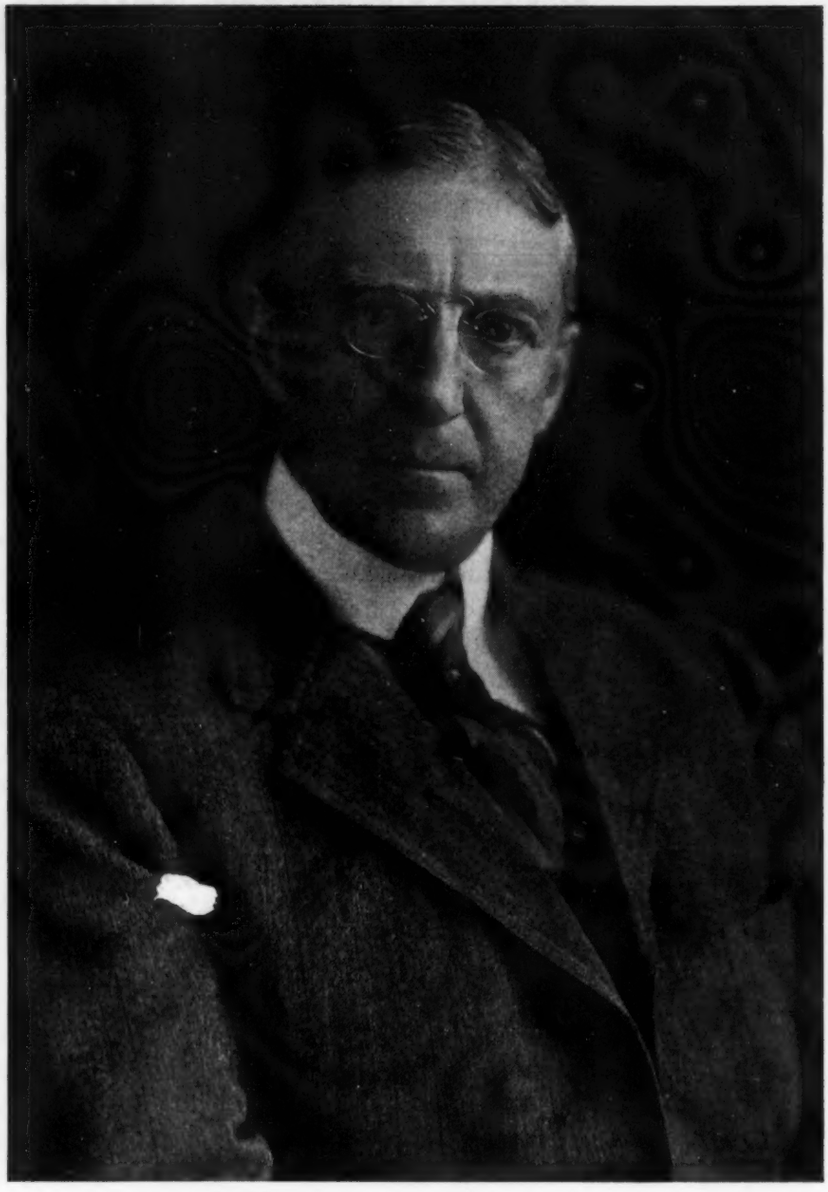
This is sound doctrine. Good *external* public relations in the commonly accepted sense — meaning a friendly sympathy with and loyalty to the utility by the people of the community—have proved stout sword and buckler in more than one emergency. But *internal* public relations prove no less potent also, both as a defensive and an offensive influence.

An understanding of the utility by the public is undoubtedly a protection against political attack. But better understanding of the public by the utility would often prevent attack. And in offensive operations how great the gain would be! When central-station men, in general, some day begin to look out beyond their purely internal purposes and problems to study their market seriously and adapt themselves to public needs and inclinations, then will the development of every class of load begin to forge ahead, instead of merely swelling with the naturally growing popular demand as has virtually been the case.

Mr. Sloan's appeal deserves serious attention on the part of utility executives throughout the country. How well do their employees understand the public today? How many executives actually know?

Francis Cole Pratt

A firm grasp of engineering in its relation to manufacturing, an active interest in education and a broad outlook are among the possessions of this successful executive.



THE statement has sometimes been made—and no doubt with some show of reason—that relatively few engineers possess marked aptitude for executive work. If this may be taken as a truism in the engineering field, then the case of Francis C. Pratt, vice-president of the General Electric Company, is one of those exceptions which go to prove the rule. Mr. Pratt may indeed be said to combine in a peculiarly effective manner the practical ideals of the engineer-executive. Equipped with an extraordinary executive mind, he has devoted most of the years during which he has been connected with the General Electric organization to the upbuilding and improvement of an engineering service of world-wide reputation, first as assistant to the vice-president in charge of engineering and manufacturing and later as himself vice-president in charge of engineering.

Mr. Pratt has never lost sight of those things which count so strongly in the development of engineers—the education and training of students in the "test" courses and of drafting-room apprentices and students in other branches of the manufacturing divisions of the company. He is a careful student of engineering education and is an active member of organizations devoted to its development. Mr. Pratt's keen knowledge of men has always enabled him to fit the best man to the right job and thus attain the utmost in co-ordination of engineering efforts. By closely directing the developments of a large body of technical men he has been successful in developing both in the general office and the field an organization which may be said to stand second to none in the effectiveness with which it carries on its work. In combining the broadest principles of administration with thoroughness in attention to engineering detail Mr. Pratt has achieved distinction in his chosen work. He is noted as a man who gets things done.

Born in Hartford, Conn., Jan. 19, 1861, of New England stock, he was graduated with the degree of Ph. B. from Sheffield Scientific School of Yale University in 1888. In 1890 Mr. Pratt entered the plant of the Pratt & Whitney Company, Hartford, of which his father was president, the son advancing to vice-president. In 1906 he became associated with the General Electric Company as assistant to E. W. Rice, Jr. In 1912 he was appointed assistant to the president and in 1919 was elevated to the vice-presidency in charge of engineering. He is a member of the A. I. E. E., the A. S. M. E. and other bodies and has been active in services to industry, science and public affairs outside strictly engineering lines.

Editorial Comment

Electrical World, July 14, 1923

Volume 82 Number 2

Coal—Another Public Utility

IN A REPORT at once dignified, comprehensive and conclusive, and of a quality to be expected from the character of the men who compose it, the United States Coal Commission recommends definitely that the anthracite-coal industry be henceforth treated as a public utility. There is also an indication that this preliminary report on anthracite presages a similar conclusion in the bituminous field.

The direct interest of the electrical industry in the coal industry is largely confined to the assurance of an adequate and certain supply of coal at prices consistent with good business. And this interest, of course, is principally in the bituminous supply. But indirectly the fact that the coal industry is actually to be a public utility is of sufficient interest to existing public utilities to make a study of the situation of value. The report includes a measure of indictment of both operator and miner. There is quite evident, in fact emphatically evident, the assumption as a matter of course that whatever is done must be done in the public interest and the conviction that affairs of the industry have so far been handled in such a way that government must step in and supervise. On this point coal men have not been without advice from the operators of present public utilities who have learned by experience that the way to avoid government interference is to anticipate the demands of the public. As J. W. Gleed recently pointed out at Oklahoma City (an abstract of his address appears elsewhere in this issue), those in charge of any business have its destiny in their own control in so far as they show themselves able to exercise an intelligent control.

But more important than that coal should be declared a public utility is the fact that, declaring it a public utility, the coal commission, with all the facts in its possession, goes on record as strongly against government ownership and operation. It rightly concludes that the greatest success will be attained only through private operation—guided and guarded, on account of the nature of the business, by some governmental agency. And it should be well and gratefully noted that the commission has carefully differentiated between proper supervision or regulation on the one hand and management, which is an improper function, on the other.

Three times now in the past four years has some government agency investigated a public utility business and, with only the public interest in view, concluded that such business is best conducted by private agencies with suitable government supervision. The Esch-Cummins act, the result of Congressional deliberation over the railroad situation, is one example; the Federal Electric Railways Commission's investigation into and report on the electric railway situation is a second, and the Coal Commission's report is the third. It is a fitting tribute to the ability and character of public utility management that all investigations and analyses based on actual fact lead to this conclusion.

Why Not a Woman's Advisory Board?

EQUIPMENT and service for the home are steadily becoming a larger and larger factor in the business of the central-station company. In its advertising as well as in conversations with customers the utility is having more and more to say about household comfort and labor saving, which mean methods and management in housekeeping. Right here is where the feminine element should come in. A man-made home is no home at all, and the wise company will neglect no opportunity to enlist the aid and counsel of the women of its organization to save it from blunders like the one made in a recent home electric, man-planned, where the milk warmer was a feature of the guest room. Similar offenses against the good sense of the housewife, no less glaring to the feminine mind, often escape the notice of the denser sex.

There is need for the co-operation of a woman's committee composed of employees and perhaps members of employees' families—for both are literally members of the organization—to act as an advisory board on questions that concern the home and the manner in which the company approaches it and tries to influence it in all points of advertising, selling and service. It is in these relationships that the good name of the utility is established and the market for electrical appliances is developed, and without the appreciative good will of the housewife progress will be slow.

Agricultural Thinking on Electric Service Problem

TO HEAR a better analysis of some of the important phases of the rural electric service problem than most central-station men could give from a man unconnected with the electrical industry is rather startling. It was, however, the experience of the North Central Electric Association at Minneapolis last week when Prof. E. A. Stewart of the agricultural department of the University of Minnesota discussed the problem. He criticised rather severely the lack of uniformity in the practices and ideas of the central-station men on rural service, because, he said, it creates distrust and suspicion in the mind of the farmer who is not familiar with the matters involved. Professor Stewart among other things took a very strong stand against the forms of rates that attempt to conceal part of the fixed costs in high minimum or energy charges, saying that they discourage the use of energy. He made an equally strong plea for the use of a fixed charge form of rate in which the fixed charge shall

cover the cost of carrying the service and thus allow a low energy rate that will encourage usage.

It is probable that many central-station men will disagree with Professor Stewart in his views and in the provisions of the uniform contract he is trying to work out in Minnesota. Dissent from views of a subject on which central-station men have so far failed to reach a common ground of understanding is not a serious discredit. The significant thing is that the character of thinking exhibited by Professor Stewart is going on in the ranks of men who are the trusted advisers of the farmer. The incident is just another straw showing the extent to which the matter is becoming more than a central-station problem. It and similar incidents will serve as a spur to central-station men all over the country to make them study the problem and themselves take the lead in thought along this line. A conclusion must eventually be reached and the electrical industry should earn the credit for finding it.

A Dream—
But It May Come True

THE announcement made before the Technical Section of the N. E. L. A. last month by C. W. Stone of the General Electric Company that radical innovations may come to pass in electric transmission and distribution practice if electron tubes are further developed and applied in the power field can hardly be considered as a wild dream. Certain electron tubes are known to have characteristics which suggest many applications he mentions. How soon his prophecies will be fulfilled depends to a great extent on the further development of tubes to secure greater reliability in operation with adaptability to handling greater amounts of power, and upon the economic pressure which may force their adoption.

Electrical engineers have learned by experience that evolution of the art comes at a rapid pace. And without leaving the possible, though venturing into the probably distant future, it is inviting to dream a little further than even Mr. Stone did. For instance, assume that electron tubes can be made to act as perfect valves, a condition they already approach to a certain extent. Assume that at least one type of tube can convert direct current to alternating current of any frequency merely by adjusting the frequency through the magnetizing coil and that alternating current of any frequency can be converted to direct current by the reverse process. It is not difficult to imagine that such tubes might be used to replace circuit breakers, rotary converters or even pole-type transformers under some conditions. Where it is desirable to take advantage of high-voltage direct-current transmission the tubes could again be used for changing from alternating current to direct current at the generator end of the line and for changing back to alternating current at any frequency desired at the delivery end. In addition, imagine what might be done in simplifying the speed control of synchronous motors by utilizing the adjustable frequency output of a "direct-current-alternating-current" electron tube. Add to these possibilities the opportunity of using electron tubes as relays for remote control by carrier current or space radio, and the possibility of using an axial magnetron as a bushing-type insulator for supervoltage, and power engineers must see the need of brushing up on electron-tube theory before innovations outrun their theoretical knowledge.

Of course, no one will jump at the conclusion that tomorrow will see such a program realized. All know that much research is to be done, much experimenting to be carried on, that much sad field experience must be had before a real beginning can be made, even if it all does come true. But this much is certain, the advance and accomplishment already a fact in electron-tube engineering should make engineers who plan constructively for the future keep these developments in mind with an eye to their possibilities.

Need of New Viewpoint
in Wooden-Pole Specifications

THE wooden-pole purchase situation is in more or less confusion because of the apparent breakdown of the effort to revise the Western red-cedar specifications and the fact that there are a number of kinds of poles in the market for which there are no recognized specifications. The biggest supply of this latter kind is of the creosoted Southern yellow-pine pole, which has made rather rapid progress in some markets in the last two or three years. The old so-called N. E. L. A. specifications are still used in the purchase of Western red cedar, and the proposed specifications that were apparently accepted as a substitute at the Atlantic City convention have never become effective because the Western Red Cedar Association has not formally accepted them, its failure to do so being attributed to difficulties of production and yarding under the specifications requirements. The American Engineering Standards Committee is coming into the situation by the formation of a sectional committee for the consideration of this subject.

Under the circumstances there is a doubt as to what sort of action should be taken. There is legitimate ground to question whether the subject ought to be approached from the viewpoint of the old specifications or whether it should be taken up from a totally different angle. A prime consideration is the slowly diminishing supply of poles, and this requires that there be an effective conservation of the available supply. An attempt made recently to ascertain the understanding among the smaller central-station men of the meaning of the old classification, "A," "B," "C," etc., yielded the interesting result that most of them were assigning a meaning of "good," "bad" and "rotten" to a classification that is purely dimensional and therefore one of strength. The reason for this lies in the fact that timber quality and strength specifications have never been clearly differentiated and the dimensional classification has been associated in the mind of the user with specifications of quality. This has undoubtedly led in many cases to the purchase and use of a pole of higher strength than is necessary, which is really an economic waste.

As a purely engineering matter the wooden-pole specification might be written in two parts. The first part would be a timber quality specification applicable to poles of all dimensions and would vary with different kinds of wood. The second part would be purely a strength grading in which the older classifications by letters would be determined and stated as certain strength requirements. These would be nominal, based on the dimensions and average fiber strength of poles of a given kind of wood, since it is impossible for the producer to give more than a certain quality of timber

and certain dimensions, these being both matters of selection and not under the producer's control as is the case in a manufactured article. With such a specification the buyer would be forced to select first for quality of timber and next for strength. If properly written, the specification should go far toward wiping out the erroneous assumption that the present classifications represent quality of timber and should encourage the use of poles in accordance with the strength that is required.

There are other questions, of course, to consider in the general revision of pole specifications. A different specification for Southern yellow pine is needed; the chestnut supply is decreasing yet the chestnut specification may need revision; pole-treating methods should be considered in their relation to specifications. While the American Engineering Standards Committee is at work on the matter and everybody is in the mood for work, a complete job should be done. To accomplish this it will be necessary to do more than follow the beaten path.

Short-Sighted Action Should Cause Enduring Reaction

THE engineers of this country have risen in righteous indignation at the summary dismissal—for that is all it can be called—of Director Davis of the Reclamation Service of the United States. That such action should come from a professional man is surprising, if not astounding. For Secretary Work is a physician and past-president of the American Medical Society, and Director Davis is a leading civil engineer and past-president of the American Society of Civil Engineers.

The question involved is not a personal one nor a political one, but one of principle and the best interests of the country. Can engineers have failed in their efforts to be of public service? The records surely indicate the opposite, and emphatically so in this particular case, for Mr. Davis' accomplishments and ability in the Reclamation Service were well recognized by the engineering profession and the public in general. But, laying aside all question of personality, if there had to be a change in the executive head of the Reclamation Service, the proper sort of person to be that executive head was an engineer—some one with an engineering background whose decisions would be made with full knowledge and appreciation of the practical possibilities as well as of the social and economic consequences of action or inaction.

Engineering pride has been hurt—yes. But, more important, if this is the beginning of an effort to put the country's public works still further into the hands of amateurs, it is a situation which needs action, not mere bewailing. Is the public health service to be administered by a former carpenter, the Bureau of Standards by an economist, the Coast and Geodetic Survey by a retired fisherman, the Department of Justice by a clothing merchant? It is encouraging that the Federated American Engineering Societies and the American Society of Civil Engineers have immediately taken steps to try to have the whole situation investigated. Let it be hoped that this occurrence will lead to a public demand too strong to be disregarded that administrative functions which are almost entirely technical in nature be vested in those whose technical training and experience will give reasonable assurance of intelligent performance.

Practical Field Testing of High-Tension Insulators

IT IS not a difficult matter to apply break-down and flashover or similar tests to insulators assembled for service but not yet put out in the field. Such tests are effective in picking out merely those insulators which are initially faulty and which may have escaped detection in the factory. Once the insulators are out on the line, however, their active history begins, and experience has shown that a good many failures in service actually occur in spite of preliminary tests on account of one sort of deterioration or another. It therefore becomes necessary in line operation to find out something about the endurance of the insulators under the conditions of service; in other words, to detect signs of coming failure. If possible, some quantitative notion of the amount of deterioration should be obtained.

It is evident off-hand that whatever the test is it must not run the risk of starting a short circuit or of changing the leakage conditions at the insulator so as greatly to disturb the conditions of strain which normally exist. Of the methods which have been thoroughly tried out, the most promising are those in which contact with an insulator shell or around a shell is made by heavily insulated contact points so that the leakage current produces a characteristic buzzing in the connected telephone the amount of which varies roughly with the extent of the leakage. Other methods used depend on measuring the leakage current around an insulator shell by the length of the feeble arc sustained by leakage when the short circuit is open.

The general drift of practice is evidently toward the telephonic methods, which are rather more easily applied and produce a minimum amount of disturbance to the potential distribution in the insulator string. Good protection can be insured to the operator by any of these methods. The point is that all depends on a somewhat rough-and-ready method of estimating the leakage current. An experienced operator really picks out the bad insulators by the increase of noise in the telephones as compared with known good insulators. The relation is therefore a matter of skilled judgment rather than of measurement, but the fact remains that the field test even with this limitation gives good results.

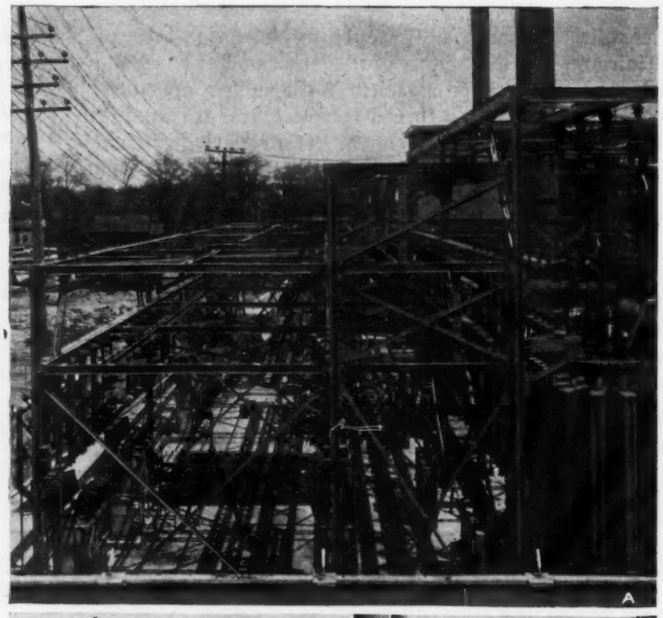
For instance, on a certain line telephonic tests showed that about one-third of the insulators were likely to cause trouble. When these particular insulators had been removed there were no failures for nine months where previously there had been about one failure per week. In other instances the same sort of testing promptly detected a considerable number of faulty insulators on a new line and detected the bad insulators on an old line, which were then removed, but, the troubles continuing, it very soon turned out by further testing that the replacement insulators taken from stock were deteriorating rapidly. Comparison of the telephonic tests with subsequent break-down tests on insulators found to be defective showed a very high correlation between the field and the laboratory rating.

The weakness of the telephonic tester is that results are only qualitative as yet. While a first-class operator can obtain much valuable information by its use, it is a little difficult for him to compare notes with another operator. It would seem possible to devise a more accurate method of measurement such as the use of a milliammeter in the plate circuit of a radio tube whose grid charge will be influenced by the condition of the insulator under test.

44,000-Volt Cable Loop Feeds This Substation of the Westchester Lighting Company

TO SERVE the rapidly growing needs of Westchester County, N. Y., a 44,000-volt cable loop has been installed and connected with the Sherman Creek station of The United Electric Light & Power Company. This loop supplants a now inadequate 13,200-volt network and is expected to meet the needs of the next fifteen years. Single-conductor 500,000-circ.mil cable is used having $\frac{19}{64}$-in. paper insulation between the core and lead sheath. The joints, as explained in the following article, are specially constructed.

Sections of the substation fed by 44,000-volt cables are shown in the illustrations: *A* is the 13,200-volt bay, *B* is the 44,000-volt bay, and *D* is the transformer bay lying between these sections; *C* shows some of the 13,200-volt feeder equipment. Three incoming 44,000-volt cables may be discerned rising out of the concrete work in the right center of *B*.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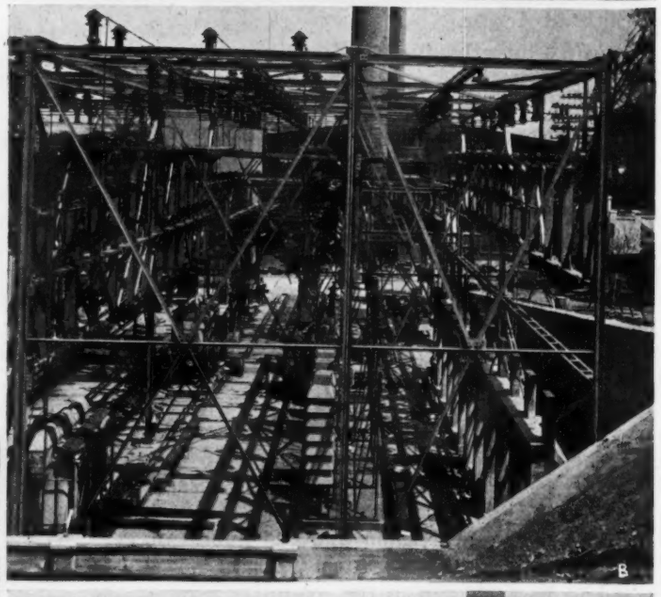
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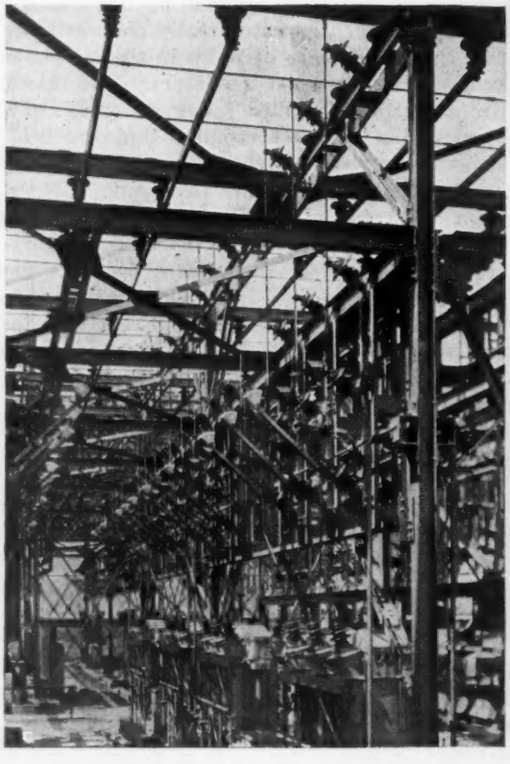
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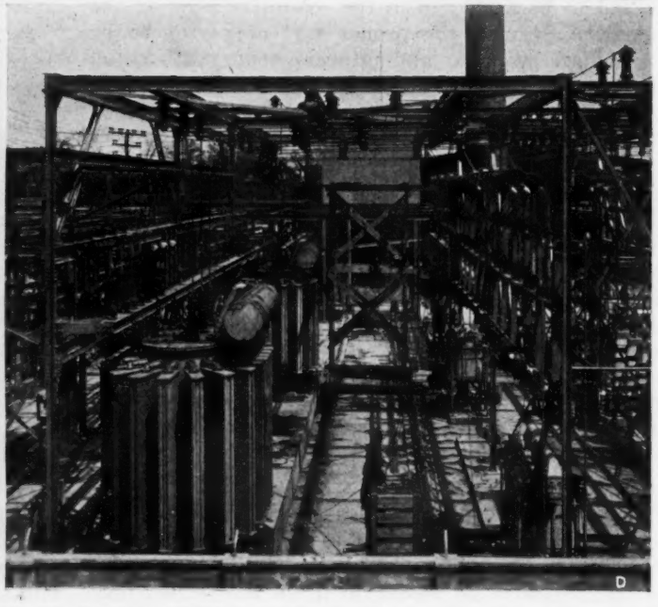

D

Underground Transmission at 44 Kv.

Growth of System and Economical Operation Dictated the Use of Single-Conductor Cables with This Rating—Details of Installation and Type of Joint Used—18,000-Kva. Self-Cooled Transformers

By R. E. DENNIS* and H. R. SEARING†

DEMANDS on the Westchester Lighting Company for energy have grown so rapidly during the last several years that the 13,200-volt network fed from the Sherman Creek station of the United Electric Light & Power Company would have become inadequate this year if plans had not been laid in the fall of 1921 to cope with the situation. An analysis showed that raising the existing voltage to 22,000 volts would not have provided adequate service long enough to justify the expense of change-over. However, it was ascertained that the provision of a 44,000-volt loop could be justified as to expense if the use of such high-voltage cable as might be needed was found advisable from an engineering viewpoint.

Since the last plan involved the installation and operation of 44,000-volt underground cables for the first time in this country, attention was first directed to the practicability of such a system and then to the cost.

Information obtained concerning systems in Europe using equally high-voltage underground cable systems indicated that there was no reason to believe that a similar system would be unsuccessful here. Accordingly, plans were begun for the first part of a comprehensive construction program which would eventually complete a 44,000-volt loop system (Fig. 2). It was decided to begin by installing the two 44,000-volt cable feeders between Sherman Creek station and New Rochelle, with the necessary step-up and step-down substations and of sufficient capacity to care for the estimated loads for a period of fifteen years. To do so, six single-conductor, 500,000-circ.mil cables would be required, and at the estimated peak loads to be supplied from New Rochelle a regulation, under normal operating conditions, of 1½ per cent, and with one feeder out of service of 4 per cent, would be had. Such cables would have current-carrying capacity sufficient also for emergency operating conditions.

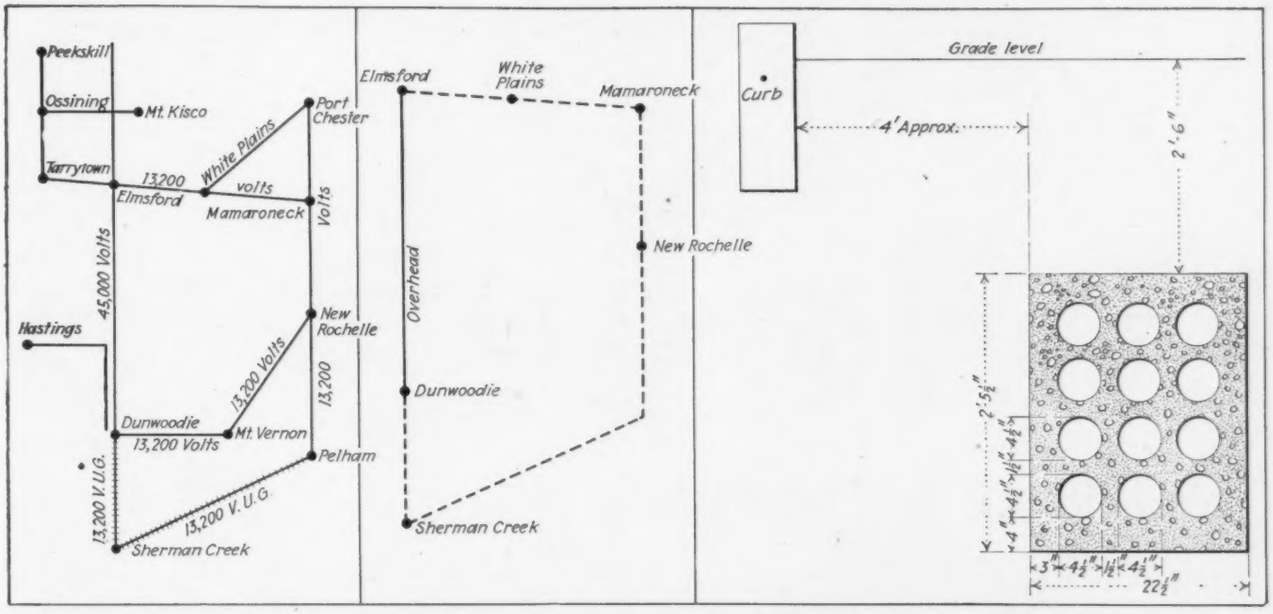


FIG. 1 (LEFT)—13,200-VOLT FEEDERS FORMERLY SUPPLIED THE WESTCHESTER LIGHTING COMPANY. FIG. 2 (CENTER)—44,000-VOLT CABLE LOOP WILL SERVE INCREASED DEMANDS. FIG. 3 (RIGHT)—TWELVE DUCT RUNS PLACED 2½ FT. BELOW GRADE LEVEL AND 4 FT. FROM CURB

TWELVE 4-IN. DUCTS USED

Underground ducts were already installed between the Sherman Creek station and the New York City line which could be altered to supply room for the new feeders. There was no duct system beyond this point, so in the spring of 1922 construction was started on a subway to contain nine 4-in. ducts for 44,000-volt cables from the New York City line to a point near the Mount Vernon-Pelham line where three ducts for 13,200-volt cables were added, making twelve 4-in. ducts from this point to the step-down substation to be provided at the company's generating station in New Rochelle. The route covered approximately 23,000 linear feet, or a total of 250,000 duct-feet. This subway was of standard design with ducts (Fig. 3) using standard (socket-joint) fiber conduit. Manholes (Fig. 4) were placed

*Assistant chief electrical engineer Westchester Lighting Company.

†Assistant electrical engineer The United Electric Light & Power Company.

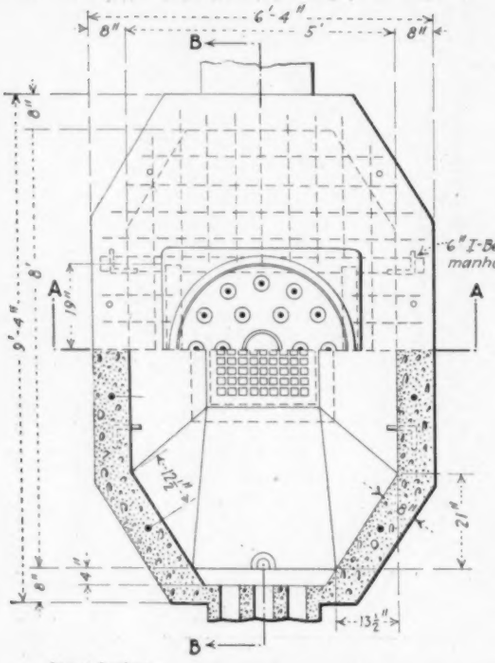
approximately 300 ft. apart except where special conditions required other spacing.

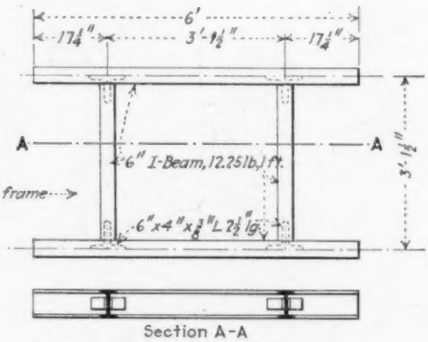
The contract for the construction of the subway was awarded to the Hickey Contracting Company of New York City, specialist in this type of work, and was completed early in the fall. The specifications for this subway called for the very best of materials and labor, with inspection of every foot, and the construction work was carried on in such a way as not to interfere with vehicular traffic over virtually the entire route.

The length of subway from Sherman Creek to the northern line of the city of New York was 34,535 ft. and required very little alteration for the new installation. The route was north on Manhattan Island, across the Harlem River in submarine cables, and through the Bronx to Pelham. The total length of cable was approximately 346,000 ft., or 66½ miles, made up of two feeders of three cables each, and all the cable was 500,000-circ.mil, $\frac{29}{64}$-in. paper insulation, $\frac{1}{8}$-in. lead cover.

The cable was ordered, in specified lengths, from the Safety and Habirshaw companies. The orders were arranged so that each feeder would be of one make of cable only. Cable delivery was started in the autumn of 1922, but severe weather conditions prevented installation during the winter. The installation work was done by the transmission and distribution department of the United company. The storage of the cable as it was delivered taxed the facilities of the United company, as at one time there were 700 reels of 44-kv. cable in the yards.

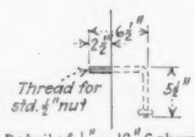
With the opening of the season the work of pulling in the cable was resumed. Using two cable gangs with gas trucks, an average of 30,000 ft. of cable was installed per week. The cable was hauled from the cable yard to the job at night, using the same trucks which pulled in the cable in the daytime. In order to insure the cable against moisture, a splicer accompanied each cable gang and wiped a seal on the end of the cable



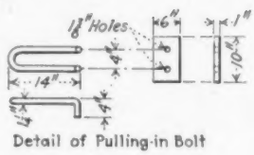


Section A-A

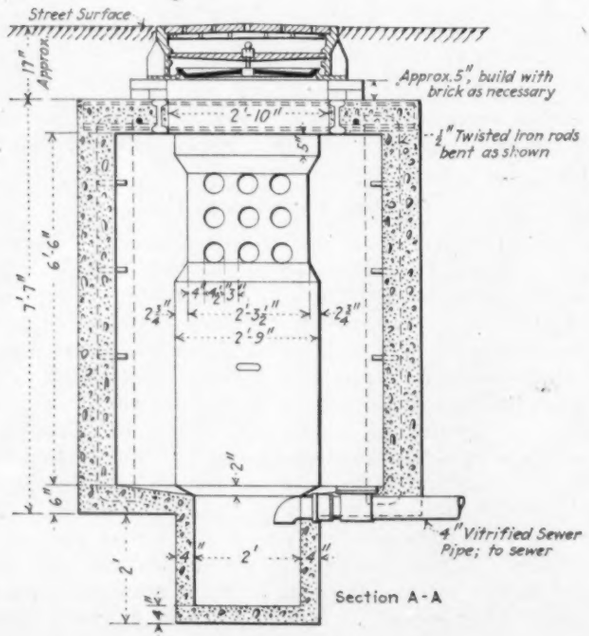
Detail of Manhole Casting Suporting Frame



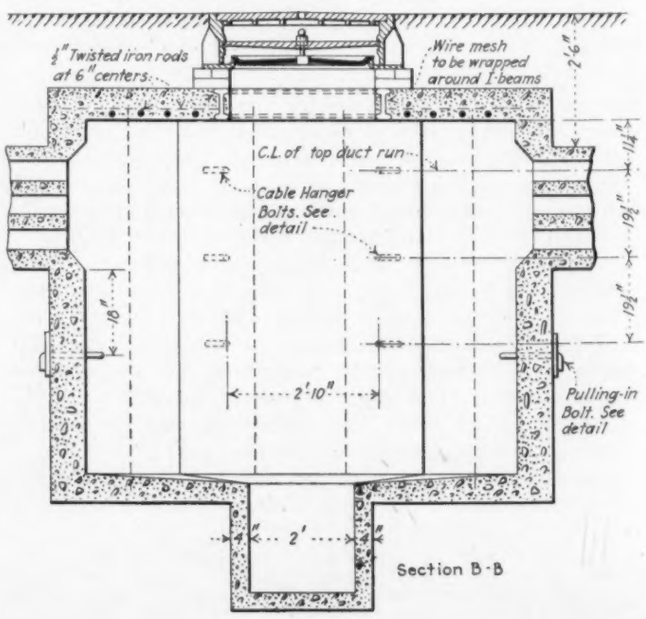
Detail of ½" x 12" Galvanized Iron Bolt for Cable Hangers



Detail of Pulling-in Bolt



Section A-A



Section B-B

before installation. The subway system throughout the route of the feeders was very wet on account of the low elevation and proximity to Long Island Sound. It was felt that this precaution was well paid for, as no "wet ends" were experienced.

The crossing of the Harlem River was provided for by special submarine cables, lead-covered, jute-served,

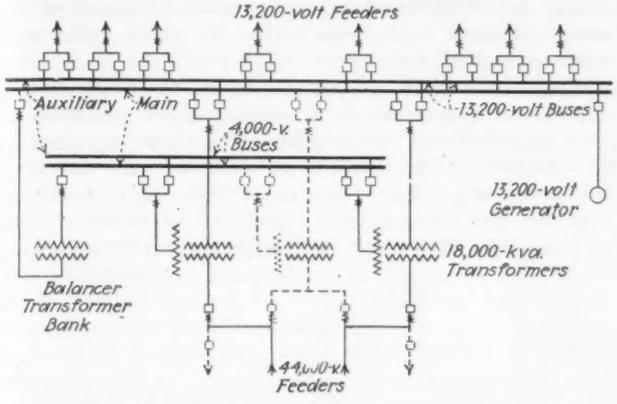


FIG. 5—SINGLE-LINE DIAGRAM OF TRANSFORMER STATION CONNECTIONS

steel-wire-armored and jute-served over all. The insulation on each cable was increased to $\frac{24}{32}$-in. paper. Precautions were taken in laying on the armor wire to prevent adjacent strands touching, so as to minimize the loss due to flux interleakage and sheath currents.

The ducts were selected so that the three cables of one feeder formed a right-angle triangle with a spacing of 5 in. - 6 in. on the sides and 7 in. - 9 in. on the hypotenuse.

The existing subway lines from the east bank of the Harlem River is composed of iron pipes under the New York Central Railroad tracks. In order to make use of vacant pipes on this run and still avoid the heavy loss due to the magnetic effect of the iron, the following expedient was resorted to:

A copper-bond cable was installed with each single-conductor cable and the ends bonded together. This combination acted like a current transformer, each bond cable carrying approximately the same current as the line cable. The flux density in the iron was negligible and the effective copper loss double that of cable alone, compared to fifteen times without the bonding.

FORCED TO DEVELOP A SPLICE

The type of splice to be used received careful consideration. While a single-conductor splice was simple in respect to the nature of the stresses developed, these stresses were high and had to be provided for. Accordingly, as soon as the line was projected, development work was begun on a joint. The United company had previously developed satisfactory joints for three-conductor operation up to 26 kv. and had a corps of able splicers to undertake the new installation.

The story of the development is too long to give here, but the results verified the facts already recognized. Successful joint construction is a problem of workmanship. Air and moisture must be excluded, and the insulation must be homogeneous and free from foreign matter.

Illustrations show the method of making up the type of joint finally adopted. The conductors are joined by a standard connector with beveled edges, the mill insulation is penciled down, and the insulation built up to its level with black cambric tape. The joint is then wrapped with a paper strip 14 in. wide and 55 ft. long, tapering in width to 10 in., so as to form a tube, when tightened up, of $\frac{13}{32}$-in. wall. The outside dimensions are 26 in. long and 4 in. in diameter. The joint is filled with petrolatum obtained from the cable manufacturer, of the same grade as that used to impregnate the cable.

Referring to the design, the cambric tape was used because of its mechanical qualities, not its dielectric strength. It is possible to wind on the cambric much tighter than paper tape of the same width. The result is the reduction of entrapped air, especially along the penciling. Another point in favor of cambric is the higher permittivity, resulting in a grading effect, distributing the stress throughout the joint.

The paper tube was adopted because of the fact that it could be wound tightly on the cable, while a solid tube of equal insulating value would have to be larger in diameter than the cable in order to slip over it during joining. The space between the cable and the tube might not be completely filled with compound, causing ionization of the entrapped air.

Tests on this joint, made over a number of hours, indicate that it is superior to the best of the cable. The questions of the life of cambric tape under stress and the migration of petrolatum from the joint can only be answered by time, although no fear is entertained by the designers.

This joint requires about four hours' time to make and the work of splicing was undertaken at the rate of three joints per day per man. By cleaning up a manhole in a day (one feeder) the actual cost per joint

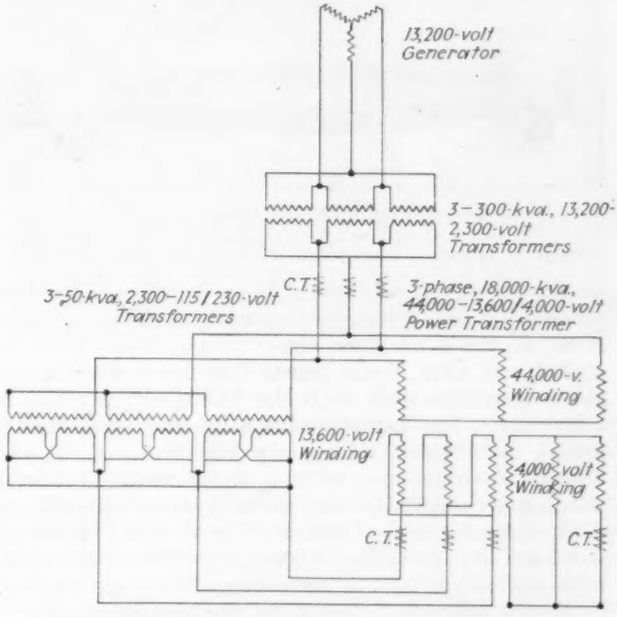


FIG. 6 — THREE 50-KVA., 2,300-VOLT TRANSFORMERS USED TO BUCK 13,600-VOLT WINDING OF 4,000/44,000-13,600-VOLT TRANSFORMERS TO PERMIT PROPER LOADING

was reduced on account of overhead charges (automobiles, pumps and supervision).

TRANSFORMER STATIONS

A description of the step-up equipment at the Sherman Creek station appeared in the March 31, 1923, issue of the ELECTRICAL WORLD. The neutral of the 44,000-volt Y is dead-grounded at this point, since it

was felt that overcurrent disturbances could be more easily handled than overvoltage disturbances.

At the receiving end provision is made for the two incoming 44,000-volt feeders and the future extension of two similar feeders to Mamaroneck; also for eight 13,200-volt feeders, a connection to a 13,200-volt generator and a balancer transformer bank (Fig. 5).

The transformers are arranged for an ultimate installation of three units of such size that two of them will equal the carrying capacity of one of the 44,000-volt feeders, which is about 35,000 kva. for two hours. The cost of cooling water made self-cooled units advisable, and so self-cooled three-phase transformers with a rating of 18,000 kva., two hours 55 deg. C. rise, were decided upon. To avoid double transformation a two-winding secondary was adopted to supply the local distribution load as well as the transmission system, the capacity of the transformer being divided between 12,000 kva. on the 13,600-volt winding and 6,000 kva.

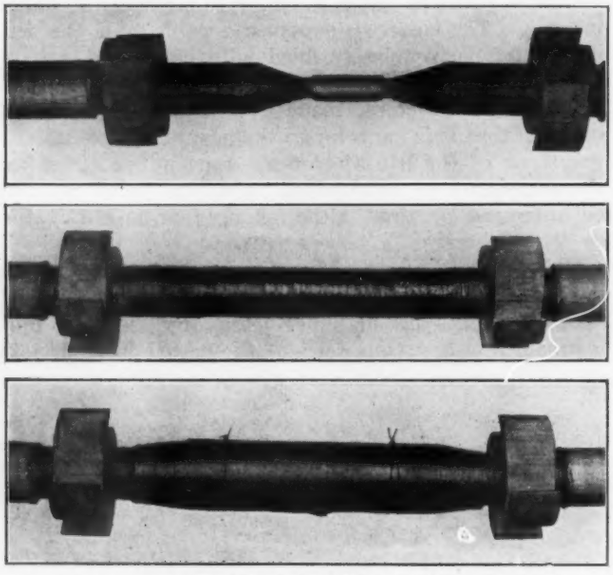


FIG. 7—SINGLE-CONDUCTOR 44-KV. CABLE JOINT

Top—Connector in place before building up insulation. Middle—Paper wrapping in place. Bottom—Cambric tape applied.

on the 4,000-volt winding. The change from a two-phase to a three-phase distribution system was to be made at the same time these transformers were installed, and thus it was possible to use a direct three-phase transformation with the 13,600-volt winding as a tertiary. Two transformers were purchased for the initial installation. They are core-type, of General Electric manufacture, with a circular-coil 44,000-volt winding Y-connected, a circular-coil 13,600-volt winding delta-connected and interleaved with the 44,000-volt winding, and a helical 4,000-volt winding concentric with and inside of the other two. They are reported to be the largest of this type yet manufactured.

Since the proportion of capacity available in the 13,600-volt and 4,000-volt windings might not agree with the demands, a balancer transformer bank was arranged to step from 13,600 volts to 4,000 volts when additional capacity was needed at one secondary voltage and was available at the other. Likewise, a connection was made to a reserve 13,200-volt generator.

On account of the liability of dangerous transients being set up in the cable feeders in case of short-circuit or as a result of switching operations, it was considered advisable to insulate the substation throughout for 66,000 volts, with the 44,000-volt cable end bells designed for a working pressure of 73,000 volts. All insulators and spacings on the 44,000-volt bays, therefore, are standard for 66,000-volt operation. The high-tension windings of the transformers received a high-potential test of 133,000 volts for one minute, and as additional protection 66,000-volt oxide-film lightning arresters with plates for 44,000-volt operation are connected to the buses adjacent to the end bells. No choke coils, however, are used.

Until such time as the additional transformer and 44,000-volt extensions to Mamaroneck are installed the two transformers are considered an integral part of the feeders. The 44,000-volt switches are therefore non-automatic, and the 13,600-volt and 4,000-volt switches are automatically operated by reverse power relays. The 44,000-volt bus connections are made so as to provide selectivity of feeders and transformers with the present installation and yet be capable of parallel operation when the additions mentioned above are made.

The oil circuit breakers were furnished by the General Electric Company, and 400-amp., 73,000-volt, form 9 A-S, and 400-amp., 15,000-volt, form 6 B-S, both type FKO-36, are used.

The disconnecting switches and busbar supports were furnished by the Electrical Engineers' Equipment Company. The disconnecting switches are of the construction known as tongue type, and those used for both 66,000 volts and 15,000 volts are illustrated. The switches and bus supports were required to have all parts above the insulator of either copper or brass to obviate the necessity of painting galvanized metal, owing to the severe atmospheric conditions of this locality. Both switches and bus supports were specified to pass a standard wet test of 135,000 volts for 66,000-volt service and 60,000 volts for 15,000-volt service. The metal fittings are clamped both to top and bottom of the insulators with detachable three-point brass rings using a cushion of woven-copper ribbon underneath to protect the porcelain from strain due to irregularities in the surface or unequal tension of the clamps. In addition, a standard pin is cemented into the bottom of the insulator. The result is a strong, rigid structure with mechanical strength greatly in excess of that required even under extreme conditions.

The standard soldered lugs were not desired for connections from buses to equipment, and special Frankel solderless connectors were used. Terminal posts on end bells, switches, etc., are designed for their use. By this means attachments are made which can be easily and quickly connected and disconnected. The same device, somewhat modified, is used for joining sections of the high-tension buses. Some of the various designs used are shown.

The construction work was done under drawings and specifications prepared by Thomas E. Murray, Inc. It was originally intended to have a steel structure galvanized throughout, but, when partly completed, difficulties encountered in galvanizing the long members and other circumstances made it necessary to abandon this plan.

The specifications stipulated that all wires and cables, high-tension, low-tension or control wires should enter and leave the substation under ground. To avoid carrying all the instrument and control wires to the switchboard, an outdoor terminal house was installed at a convenient place in the structure. Two sources of direct current are carried to buses in this house, and

the disconnecting links for testing, etc., are placed there. Automatic relays provide for a continuous supply of direct current as long as either source is alive.

The size of the transformers prevented shipping them filled with oil. The core and coils were shipped as a unit and the rest of the transformer was assembled on the ground. Weather conditions were not favorable at the time for out-of-door assembly, and so particular care was taken in drying them out. After the core and coils were put into the tank, the radiators and all fittings were assembled as though the transformers were being made ready for service. They were then filled with warm oil and the usual impedance heat run started. Difficulty was immediately encountered in loading up the three windings equally. Moreover, even winding sufficiently to permit loading the 45,000-volt and 4,000-volt windings. When these connections were made, and with the other means described above, it was comparatively easy to raise the top oil to about 80 deg. C. After seventy-two hours of continuous filtering at this temperature the samples of oil drawn withstood a test of 35,000 volts with the standard gap. As this was the limit of the voltage range of the testing transformer, no effort was made to determine the actual dielectric strength of the oil.

Following full potential for several hours and a ratio check made on account of the field assembly of the tap changer, the transformers were considered ready for service.

It is interesting to note that the charging loads

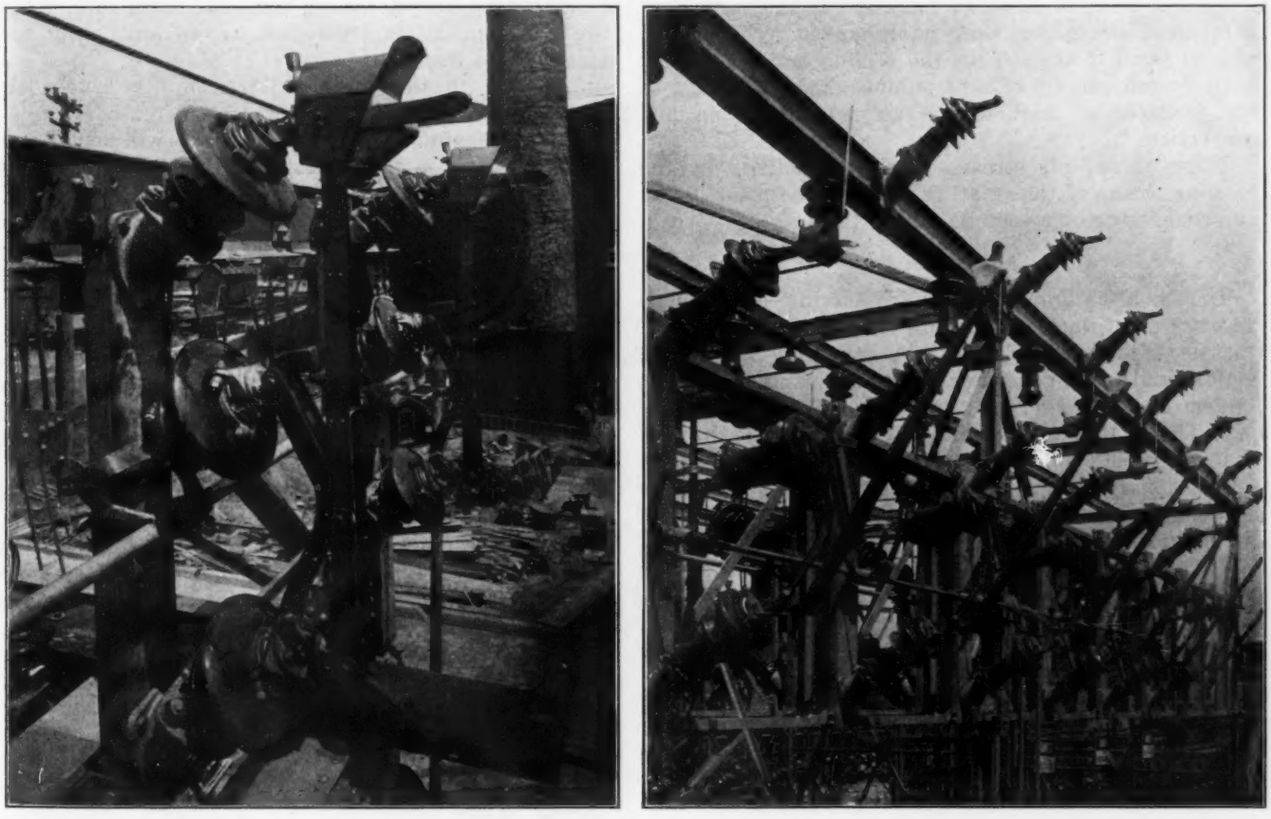


FIG. 8—13,200-VOLT AND 66,000-VOLT DISCONNECTING SWITCHES

at a considerable overload it was impossible in this way to raise the temperature more than about 10 deg. C. above ambient. The transformers were then placed on their foundations and a wooden house built as closely about them as possible. A live steam line was run into the house, and a five-pipe heating coil was run the entire length on one wall just above the floor. Even after this was done it was impossible to obtain the proper temperature. The oil was lowered about a foot below the top of the radiators to prevent circulation, and a De Laval oil separator was used to circulate the oil through a heating coil (where a rise of about 10 deg. C. was secured) and filter it at the same time. By this means heated oil was constantly pumped into the tank during the heat run.

The unbalance in the loads taken by the three windings still prevented satisfactory results; so three 50-kva. standard 2,300-volt distribution transformers were connected as shown by Fig. 7 to buck the 13,600-volt of one line is about 2,500 kva. leading. A network of such feeders would aid considerably in the improvement of power factor.

The operation of this installation will be watched with great interest. From the test results on cable and joints higher voltages on underground cable can be expected soon. Single-conductor cable will probably be used entirely for this class of work, because of its simplicity and the fact that faults can occur only to ground.

Many of the textbooks on civics were written before the regulation of utilities became a governmental function, either state or national, hence contain nothing in relation to the subject. But there is no longer any excuse for failure to include proper treatment of these subjects, and the lack of such text is a reflection on the intelligence of educators and textbook writers.—E. V. KUYKENDALL at the N. E. L. A. convention.

Cooling of Turbo-Generators*

Rating Limited Only by Temperature—Elaborate Experiments Show Rate of Heat Dissipation with Free and Forced Ventilation—Rotational Effects Determined and Comparisons of Air with Water and Oil Are Made

By GEORGE E. LUKE
Westinghouse Electric & Manufacturing Company

IN ORDER to improve the rating of electric machines, it has long been the practice to use forced air ventilation. Radiation plays very little part in dissipating the heat from the internal rotor surfaces. Most of these surfaces are at the same temperatures; hence the heat interchanged by radiation will be small if any. Thus the cooling action obtained with forced air convection is due almost entirely to the transfer of heat to the air by conduction and convection.

These forced air streams may be produced by the fanning action of the rotating parts on the rotor, by an external fan or by a combination of the two.

AXIAL DUCTS

The cooling of a machine by forcing air to flow through axial ducts in the core is a type of ventilation that is used in many machines, especially in railway motors and turbo-generators. Some advantages of this system of ventilation are:

1. The heat may flow radially through the iron to the ventilating surfaces without passing through the laminations. This is an advantage since the resistance to heat flow across the laminations is from thirty to fifty times that along the laminations.

2. The air flows through the ducts at a uniform velocity since the cross-section is constant. This gives a minimum air pressure for a given average air velocity.

3. Owing to the rough surface obtained, a high rate of heat transfer is obtained.

4. The core length of a machine will be a minimum for a given magnetic flux.

Some disadvantages of the axial system of ventilation are:

1. A fan or blower is necessary to force the air through the ducts.

2. The axial ducts must be placed in the core where the loss per unit volume is a minimum. This will give a fairly long heat-flow path from the tooth zone, where the maximum losses are found, to the ventilating surfaces of the ducts.

3. Owing to the space required by the ducts, the over-all diameter of the core will be increased.

4. The maximum iron temperature will usually be found adjacent to the hottest air; that is, near the end of the ducts.

The heat dissipated from the ventilating surfaces of axial ducts is influenced by the air velocity, size and shape of ducts and the roughness of the duct surface.

RADIAL DUCTS

The most common method of cooling the cores of rotating machines is with the use of radial air ducts. Some advantages of the radial duct system are:

1. Radial ducts on the rotating element act as blowers, hence are self-ventilating.

2. Maximum air velocities are found where the losses are most concentrated; that is, in the tooth zone.

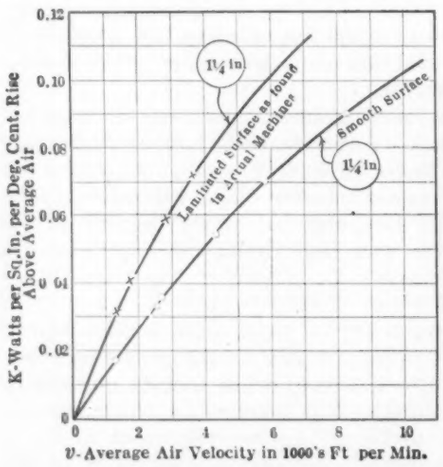
3. The air reaches the tooth zone before it has become appreciably heated, and the maximum air temperature is found where the iron losses per unit volume are a minimum.

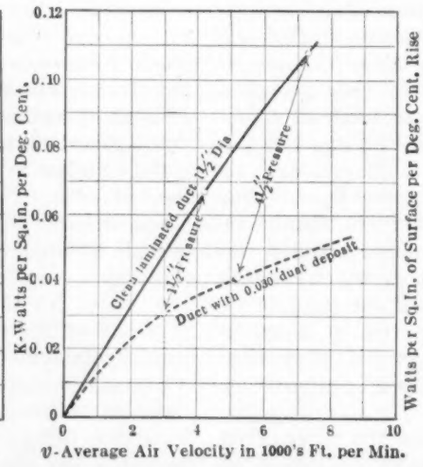
4. Parallel ventilation of the end windings and the radial ducts is very simply accomplished.

Some of the disadvantages of the radial air duct system are:

1. On rotors having low peripheral speed the fanning action of the radial ducts is small, since the volume of air forced through is directly proportional to the peripheral speed for any given machine.

*Abstract of paper presented before the convention of the A. I. E. E. at Swampscott, Mass. June 25-29, 1923.





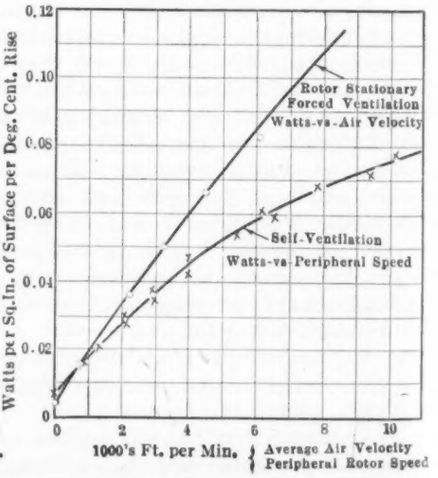


FIG. 1 (LEFT)—WATTS DISSIPATED FROM INTERIOR SURFACE OF AXIAL DUCT, SHOWING EFFECT OF SURFACE. FIG. 2 (CENTER)—EFFECTS OF COALDUST DEPOSITS ON DISSIPATION OF HEAT FROM AXIAL DUCTS. FIG. 3 (RIGHT)—DISSIPATION OF HEAT FROM SURFACE OF ROTOR 25 IN. IN DIAMETER AND 36 IN. LONG

2. The majority of the heat due to the iron losses in the interior of the iron packet between two ventilating ducts must be conducted to these ducts through the intervening laminations. Since the resistance to the flow of heat across the laminations is thirty to fifty times the resistance to the heat flow along the laminations, it is thus necessary to limit the length of the heat-flow path by close spacing of the radial ducts.

3. On high-speed machines, especially induction motors, the windage noise may be excessive for certain applications.

4. On machines using small widths of teeth the duct opening may be too small for effective ventilation and may become closed in service by dust and lint deposits.

5. On small diameter machines the air intake to the radial ducts in the rotor spider is apt to be restricted.

6. The radial ducts increase the gross core length and hence the distance between bearings.

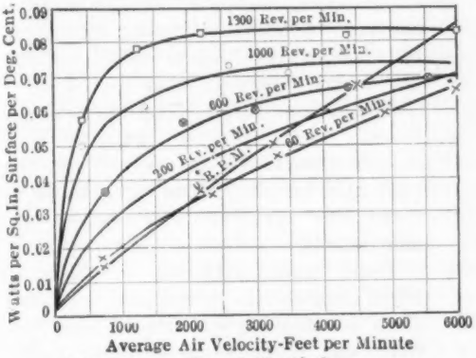

1300 Rev. per Min.
1000 Rev. per Min.
600 Rev. per Min.
300 Rev. per Min.
60 Rev. per Min.
Watts per Sq.In. Surface per Deg. Cent.
Average Air Velocity-Feet per Minute through the Air Gap

FIG. 4

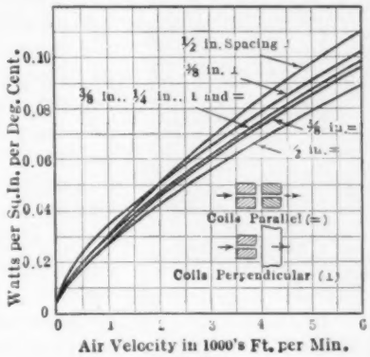


FIG. 5

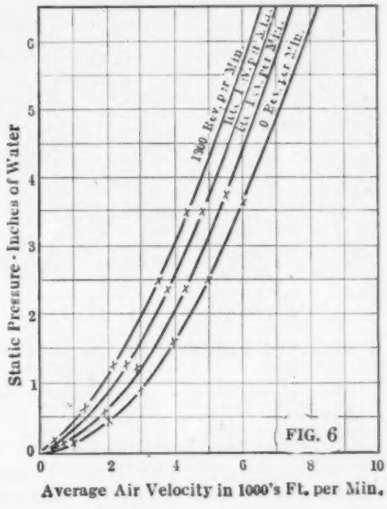


FIG. 6

Fig. 4—Watts dissipated from surface of rotor (25 in. in diameter, 36 in. long) with forced axial ventilation through single ⅛-in. air gap. It may be seen that with a high rotor speed (1,300 revolutions per minute) the heat dissipation constant is practically the same for air velocities ranging from 2,000 ft. to 6,000 ft. per minute. Conversely, it is seen that with the rotor stationary this dissipation constant is practically proportional to the air velocity through the air gap. With a rotor speed of 600 r.p.m. an intermediate condition is shown.

Fig. 5—Total static pressure required to force air through single ⅛-in. air gap (rotor 25 in. in diameter, 36 in. long).

Fig. 6—Dissipation of heat from end windings by forced ventilation.

The fingers or ventilating spacers used in the radial ducts are not only effective in mixing up the air flow streams but they also increase the ventilating surfaces. Calculations will show that on the average machine the average temperature of the ventilating spacers is at least 90 per cent of the main-duct surface temperatures. This additional ventilating surface on some machines will increase the effective duct surface as much as 30 per cent.

On machines of small diameter where the air velocity through the radial ducts is changing continuously the average heat dissipation can be taken on the basis of the average air velocity. This is justified by the fact that the heat-dissipation constant is practically proportional to the air velocity.

Tests have indicated that for all practical purposes the transfer of heat from the surfaces of axial or radial ducts is almost proportional to the average air velocity forced through these ducts. Experience, however, on the removal of heat from a rotating armature, for example, does not exactly agree with the above law. Furthermore, up to the present time no definite data were available regarding the effects of forced air convection currents along the surface of a rotating element. For these reasons this phase of the cooling problem was investigated on a model rotor.

According to data obtained with self-ventilation, the cooling curves bend over with high rotor speeds. This indicates that some of the hot air is carried around with the rotor. With forced ventilation, however, the air is forced to pass through the duct. The dissipation of heat is proportional to the number of air molecules passing a given surface and to the temperature difference between the surface and those air molecules. This is shown by the dissipation constant being roughly proportional to the air velocity with forced ventilation. The curve gives 0.004 watt per square inch per degree centigrade with zero air velocity. This is due to the fact that there was some air leakage caused by convection current. With self-ventilation about 0.008 watt per square inch per degree centigrade is dissipated with the drum stationary, owing to convection and radiation. It is estimated that with a peripheral velocity such as is obtained in turbo-generators of 20,000 ft. to 25,000 ft. per minute the dissipation constant will have reached its maximum value of about 0.10 watt to 0.12 watt per square inch per degree centigrade rise with natural ventilation. With forced ventilation under the conditions shown, there seems to be no limit to the amount of heat which can be dissipated. In practice, however, there are several factors which limit to a certain extent the maximum air velocity, such as friction and windage or blower input.

Although results of tests show that with respect to the rotor the heat dissipation is by no means proportional to the average air-gap velocity, yet with respect to the stator the conditions are entirely different and a heat dissipation roughly proportional to the air velocity is to be expected. With the high rotor speeds a high dissipation constant is obtained with low average axial air velocities. This indicates thorough mixing of the air and good scouring action of the rotor surface. However, under these conditions with a long core the temperature of air would rise to an excessive value, which would also mean an excessive iron temperature, unless other means of ventilation of the core were used.

Thus it is seen that under certain conditions more heat can be dissipated with the rotor stationary than when it is rotating with the same temperature rise and same quantity of air through the air gap per minute.

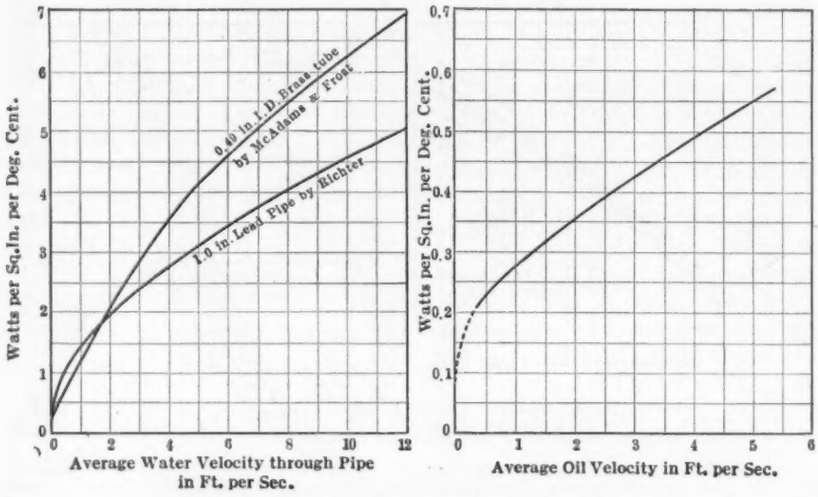
The air resistance along the stator is comparatively low, so that under these conditions high axial air velocities are found adjacent to the stator while the axial air velocity adjacent to the rotor is small. Thus with a rotor speed of 1,300 r.p.m. doubling the quantity of air through the air gap changes the axial air velocities

adjacent to the stationary air conduit, while the effective air velocity sweeping across the rotor surface is unchanged.

STATIC AIR PRESSURE

The disturbing influence of the rotating drum upon the flow of air through the air gap is shown by the accompanying static air-pressure curves. Thus an average air velocity of 3,000 ft. per minute through the air gap requires a total static pressure of 0.9 in. of water with the drum stationary. With the drum rotation at 1,300 r.p.m., or a peripheral speed of 8,550 ft. per minute, 1.97 in. of water static pressure is required to force through the same amount of air. Also, an average air velocity of 5,000 ft. per minute through the gap requires a pressure of 2.5 in. with the rotor stationary and 4.34 in. with a rotor speed of 1,300 r.p.m.

With a rotor peripheral speed of 20,000 ft. per minute, such as found in turbo-generators, and an average air-gap velocity of 5,000 ft. per minute, the total static air pressure which would be required for the apparatus tested amounts to 9.3 in. of water.


Watts per Sq.In. per Deg. Cent.
0.49 in. I.D. Brass tube by McAdams & Frost
1.0 in. Lead Pipe by Richter
Average Water Velocity through Pipe in Ft. per Sec.
Watts per Sq.In. per Deg. Cent.
Average Oil Velocity in Ft. per Sec.

FIGS. 7 AND 8—COEFFICIENT OF HEAT TRANSFER BETWEEN METALLIC SURFACE AND FORCED WATER STREAM AND OIL STREAM RESPECTIVELY
(Viscosity of oil = 50 Saybolt)

DISSIPATION OF HEAT FROM END WINDINGS

The results of tests on the heat-dissipating qualities of end windings are shown in one of the accompanying curves. The values given for the $\frac{1}{8}$-in. and $\frac{1}{4}$-in. air spaces are mean values for all the curves. This one curve is not only common for both types of ventilating spaces but is also common for both coil arrangements.

That is, the heat transfer coefficient is the same with the coil axes parallel and at right angles to each other. The values given for the $\frac{3}{8}$-in. and $\frac{1}{2}$-in. air spaces with the coils parallel lie below this mean curve, while the values for these spacings with the coils at right angles are above the mean curve. It should be noted that the rate of increase of the heat transfer per 1,000-ft. air velocity is practically the same as that given for the laminated axial ducts.

SUMMARY

Tests on the dissipation of heat show that the rate of heat transfer is approximately proportional to the average air velocity and not to the square root of the velocity, as has been previously published. Another unexpected result is that the unit rate of cooling of the small circular ducts tested was practically the same as that found for the larger ducts over a considerable air-velocity range. The rate of heat dissipation by radial ducts does not differ materially from that found for axial ducts; also, there is no great difference between the heat liberated from the narrow and from the relatively wide ducts.

The heat loss with self-ventilation, due to the rotation of a rotor, is not proportional to the peripheral velocity. The heat-dissipation curves for the rotor during rotation with separate ventilation along the periphery or air gap are very complicated, being influenced by both the peripheral velocities and the forced air velocities.

The great value of proper ventilation of the end windings in electric machines is shown by the rate at which heat can be dissipated from the surfaces with forced air ventilation.

Tests made with the air flow at right angles to cylindrical surfaces show a much higher rate of heat flow than was found from axial or radial duct surfaces.

A study of some tests for the heat dissipation constants obtained with water and oil cooling shows that the constants given for liquids are several-fold greater than those constants which apply for gases. Water is a medium which is particularly adapted to cooling apparatus, since it possesses a very high rate of heat transfer coefficient.

Forcing Most Economical Load Division by Reactors

SEVERAL typographical errors unfortunately occurred in the article by A. H. Sweetnam in the June 23 issue of the ELECTRICAL WORLD. The most confusing were in the explanation of the diagram on page 1464. The legend should have read as follows:

A—Total reactance required in No. 4/0 B. & S. line in order to divide current and kilowatt load with 300,000-circ.mil line (having 1-ohm external reactor) in accordance with respective cross-sections.
B—1-ohm external reactor in 300,000-circ.mil, 1-mile line.
C—1.482-ohm external reactor required in No. 4/0, 1-mile line in order that lines may divide current and kilowatt load in accordance with cross-sections.
D—1-ohm external reactor in 300-circ.mil, 5-mile line.
E—1.739-ohm external reactor required in No. 4/0, 5-mile line in order that lines may divide current and kilowatt load in accordance with cross-sections.
F—1-ohm external reactor in 300,000-circ.mil, 10-mile line.
G—2.061-ohm external reactor required in No. 4/0, 10-mile line in order that lines may divide current and kilowatt load in accordance with cross-sections.
H—2.382-ohm external reactor required in No. 4/0, 15-mile line in order that lines may divide current and kilowatt load in accordance with cross-sections.
J—300,000-circ.mil cable impedance.
K—No. 4/0 B. & S. cable impedance.

Under Table I, page 1463, a footnote appeared containing an equation giving the value of external reactance in ohms for No. 4/0, which should have read $1.4175(1 + 0.178N) - 0.188N$, where N = the length of the cable in miles. In Table II the fifteenth line of data should obviously have referred to a circuit 15 miles long. A parenthesis should have followed the figure 1.94 in the formula three lines below the cut in the first column on page 1464.

Effective Lighting Plan for a Small City

Fremont, Ohio, Affords Excellent Example of the Way in Which the Demand for Improved Illumination of Streets Due to Intercity Automobile Traffic Can Be Met in Places of Small Population

By EARL A. ANDERSON* and E. D. CHAPMAN†

THE tremendous increase in intercity passenger and truck automobile travel has brought better business to small cities situated on the line of travel. It has at the same time brought these small cities face to face with a condition of traffic and crime hazard which was not even thought of when street-lighting plans were being formulated a few years ago. There is not only a general increase in local traffic over the whole city, but also a cumulative concentration of traffic on main thoroughfares resulting from intercity traffic. Some of these highways now carry much more traffic than important streets in large cities. Unfortunately, with this traffic there has come the entry of reckless criminal elements from near-by large cities. Thus the small lamps and wide spacings of street-lighting systems which were once considered sufficient for towns and smaller cities are now totally inadequate; in fact, the street-lighting requirements on the principal thoroughfares in these towns are almost as exacting as those of the big cities.

Fremont, Ohio, a city of about 12,500 people, has been one of the first of the smaller cities to grasp the seriousness of this changed condition of traffic and to visualize the tremendous value of street lighting in advertising the progressiveness of the city to out-of-town users of its streets. At the expiration of the previous street-lighting contract the officials of the city determined upon a comprehensive redesign intended to meet the following points:

1. A closer spacing of lighting units on all residential streets which would eliminate dark shadows and create an atmosphere of safety and comfort for drivers and pedestrians, including women and children who had occasion to use the streets and sidewalks after dark.

2. A bright "white way" in the central business district which would attract trade and dispel an impression of deadness in the business district after nightfall.

3. Adequate lighting for the principal thoroughfare from city limit to city limit, making this highway thoroughly safe and comfortable for travel.

These desires had to be satisfied in as economical a fashion as possible, for Fremont, in common with most cities, was heavily burdened with other municipal expenditures. It was, therefore, not possible to provide for underground distribution except in the "white-way" system, and the choice of equipment throughout had to be made primarily on the basis of efficiency and neatness of appearance, with consideration of ornamental features a secondary matter. In view of the conditions involved it is believed that the new system installed has resulted in street lighting which serves its purpose to a degree exceeded by few installations elsewhere.

The old lighting consisted of a total of 328 lamps—that is, 238 4-amp. magnetite-arc lamps and ninety 80-cp. incandescent lamps. This system failed even to provide lamps for all the street intersections throughout the city. The new system employs 602 gas-filled street series lamps ranging in size from 600 cp. to 100 cp.

The "white way" lighting of Front Street is shown in Fig. 1. "Novalux" fixtures mounted on 13½-ft. pressed-steel standards equipped with 600-cp., 20-amp.

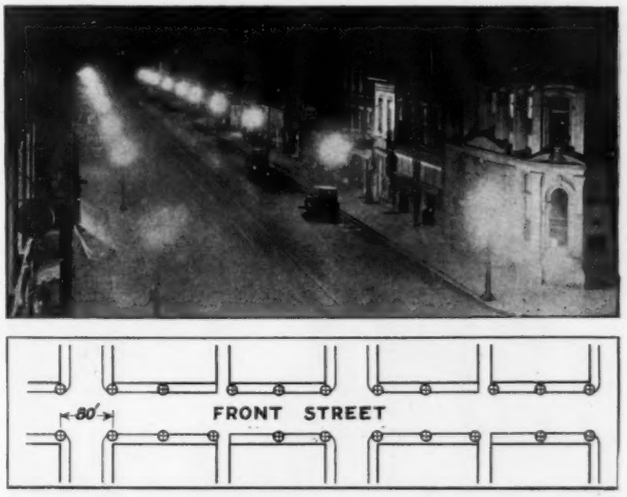


FIG. 1—ORNAMENTAL "WHITE WAY" LIGHTING, FREMONT, OHIO

600-cp. (6,000-lumen) gas-filled lamps, equipped with "Novalux" units, mounted on pressed steel posts are spaced from 80 ft. to 90 ft. apart on each side of the street. The mounting height is 13½ ft.

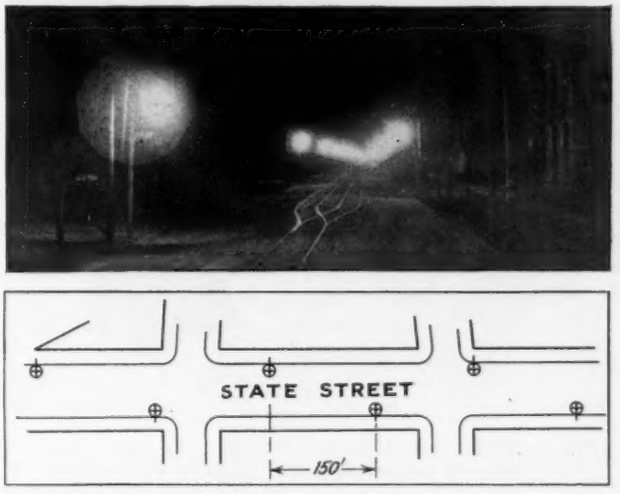


FIG. 2—NEW LIGHTING ON MAIN THOROUGHFARE OF PROGRESSIVE SMALL CITY

A part of the main highway between Detroit, Toledo and Cleveland. 600-cp. (6,000-lumen) gas-filled lamps in ornamental-bracket "Novalux" units; staggered spacing, one lamp for each 150 ft. of street; mounting height, 20 ft.

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lamps are spaced about 80 ft. apart on each side of the street.

The main highway through the city is State Street, carrying traffic between Detroit, Toledo and Cleveland. On this thoroughfare 600-cp., 20-amp. gas-filled lamps are used in bracket "Novalux" units as shown. As the street is wide, the lamps were placed on each side and staggered, with one lamp for approximately 150 ft. of street. Upward light on a thoroughfare of this character is of little value, but bright street illumination is of the greatest importance for safety. Accordingly, the equipment selected consisted of rippled globes with refractors which direct a large proportion of the light to the street surface. Fig. 2 shows the street

FIG. 3—STREET-LIGHTING REQUIREMENTS OF THE VARIOUS SECTIONS ARE MET WITH THESE TYPES OF EQUIPMENTS

Upper Left—Business district lighting; Form 9, "Novalux" ornamental unit. Upper Right—Thoroughfare lighting; Form 25, large "Novalux" basket-style unit with light alabaster rippled-glass globe and dome refractor. Lower Left—Residential district lighting; Form 6, "Novalux" pendent unit with clear rippled globe and dome refractor. Lower Right—Lighting in outlying districts; "Novalux" pendent unit with dome refractor.

surface appearing to the eye as a sheen of nearly uniform brightness against which objects stand out sharply and distinctly. The mounting height of 20 ft. places near-by units outside the ordinary range of vision of automobile drivers, and consequently even on dark, rainy nights the light sources are not annoying from the standpoint of glare.

For the less-traveled thoroughfares 400-cp., 15-amp. lamps in rippled-globe dome-refractor units mounted on mast arms at heights of 20 ft. to 25 ft. above the ground are used. On residential streets smaller dome-refractor fixtures without globes equipped with 250-cp., 6.6-amp. lamps are used suspended from mast arms. In alleys and for certain outlying districts the ordinary radial-wave reflectors with 100-cp. lamps are employed.

Both station-type and pole-mounted movable-coil regulators feed the series circuits. Individual-series two-coil transformers mounted in the base of the posts in the case of the "white way" lamps and overhead at the cross-arms in the case of the remainder of the system are used for supplying the 15-amp. and 20-amp., 400-cp. and 600-cp. lamps. These transformers avoid high voltage at the lamp fixtures and eliminate the possibility of open circuits due to breaks in the lamp loops. In order to reduce trouble from tree grounds, the small lamps in residential districts are grouped on one-to-one-ratio transformers connected into the high-tension series circuits.

The old lighting from the 328 units provided an approximate total of 102,000 cp. at a cost to the city of about $15,500 per year. The new lighting represents an approximate total candlepower of 182,000, or an increase of 78 per cent in quantity of light and an added improvement in the distribution of candlepower. The annual cost under the new lighting contract is approximately $22,000, an increase of only 42 per cent. The expenditure per capita for the new street lighting is $1.78 annually. This is more than double that in the average city where adequate street lighting under the new conditions of travel has not been worked out as yet, but is a very moderate investment for the value returned. A tabulated summary of the equipment employed and the rates adopted for the Fremont installation is given.

EQUIPMENT AND RATES, FREMONT STREET-LIGHTING SYSTEM

Kind of Street	Number of Lamps	Size, Cp.	Rate
"White way"	22	600	$60.00
Thoroughfare (Main)	67	600	55.00
(Secondary)	151	400	47.00
Residential	216	250	32.00
Outlying and alleys	146	100	22.50

Effect of Impurities in Storage-Battery Electrolytes

THE importance of obtaining information concerning the action of impurities in storage-battery electrolytes arises from the detrimental effects which many of them produce on the operating characteristics and life of the storage battery. Such information is necessary as a basis for the preparation of specifications covering sulphuric acid for use in batteries. A new method of measuring the rate of sulphation of storage-battery plates was recently devised at the Bureau of Standards. The same method and apparatus have been employed in the present investigation with some modifications, and the effects of small amounts of iron, manganese, platinum and copper have been determined. It was found that the presence of one part in ten million of platinum in the electrolyte increases the local action at the negative plates 50 per cent. The effect of copper is much less, while the effect of iron is of unusual interest because of its accelerating action at the negative plates. Manganese is deposited upon the positive plates in the form of manganese dioxide which covers the active material, closes the pores and causes a large amount of charging current to be wasted as gas. Work is being extended to include the effect of other impurities.

Friendship the Basis of Public Relations

Because Utilities Are Dependent on the Intelligence and Moral Sense of the Public, Friendship Is the Real Utility Need—The Public Can Be Taught Economic Truth

By J. W. GLEED
General Attorney Southwestern Bell Telephone Company

ONCE in a long time some man stands up in the company of his fellows and talks of the things of the heart. He lays open the personal and business conscience of his kind and examines and displays the contents. He talks of the value of these things and the uses they should be put to. And though all that he says is of the common knowledge and experience of all who listen, still it is not of the common thoughts of the average individual, whose busy-ness habitually crowds down and covers up these matters of the heart until they come to be quite unknown through pure unfamiliarity. And so the words of the speaker fall with all the strength of new thought, new truth, new light and a deeper wisdom.

Not long ago, at the joint convention of the Southwest Geographic Division, N. E. L. A., and the Oklahoma Utilities Association at Oklahoma City, a utility lawyer talked one morning on the value of friendship to the public utility, of the rights of the people to control the public service and of the responsibility of these their servants to assist them sympathetically to understand and make their regulation fair and helpful. And he spoke so plainly of the simple elements of justice in this relationship between the people and the public utility that his address made a very deep impression. Space permits the publication of little more than half of Mr. Gleed's address, but it presents with an unusual clarity of expression a most convincing argument for the revival of old-fashioned homely friendship in the business of the modern central-station company.

A FEW years ago the citizens of San Francisco passed a law reducing telephone rates. Observe, please, that the citizens passed it—not the Legislature, not a commission, not the city government. The voters passed it. It was an initiated measure—that is, a measure placed before the voters by the petition of a certain small number of private citizens, representing only themselves. There was no hearing, no evidence, no debate. The users of telephone service concluded they were paying too much and so they voted to pay less. At the same election the people recalled a judge because of an unpopular decision he had made.

In the State of Missouri we have this same institution of the initiative, and next fall, on the petition of a comparatively few voters, we could, I suppose, have a popular vote on universal state-wide telephone exchange service at a dollar a month and toll service at ten cents a call. I do not, of course, think that any such thing is likely to happen. I am merely pointing out that it might happen.

THE POWER OF THE PUBLIC

And the power of the public is by no means confined to states where the initiative and the recall have been adopted. In nearly all the states there exist public bodies having power to fix rates, and while all states have constitutions providing in substance that our property shall not be confiscated, yet constitutions can be changed; and, furthermore, the enforcement of constitutional provisions depends on men—men selected by the people, paid by the people, and if not subject to instantaneous recall, yet always subject to recall at the end of their respective terms. We have, of course, the national Constitution and the federal courts; but we have these only so long as the sovereign people permit, and that might not be forever. And, finally, constitutions and laws are as mere scraps of paper, anyway, unless they exist in the minds and hearts of the people. Mexico has a beautiful paper constitution but very poor government.

It is to be observed, furthermore, that while farm property, for example, has for its protection a great multitude of farm voters, utility property has practically no votes behind it at all. Stockholders are numerous in one sense, but stockholders plus employees, if employees choose to vote with the owners, amount to very few when compared with the whole number of voters. The Bell System in the United States has in round numbers 250,000 stockholders and 250,000 employees, but there are a hundred and sixty voters to every stockholder. Of course our "indirect" stockholders—that is, the creditors of the savings banks and insurance companies owning our stock—are very numerous, but their interest is too indirect to make them of material use to us.

The fact is that the company by which I am employed, the Southwestern Bell Telephone Company, has scattered about $150,000,000 worth of property over and under the streets and highways of five states and in the houses of Thomas, Richard and Henry; and there it is, all in the possession of the people. Much of it the law would not let us remove; much of it it would not pay to remove even if the law made no objection. To state the whole matter briefly, we are in the hands of the public; the public is our master. In the end we are compelled to accept as a reward for our endeavors just about what the intelligence and moral sense of the public awards us.

PUBLIC MORAL SENSE GOOD

Now, so far as moral sense is concerned, I think that our patrons and the patrons of all utilities are, taken as a whole, disposed to deal fairly with us, so far as they know. This may not be so in every instance, but generally I think it is true. Generally speaking, our patrons are disposed to be fair. But if not, there is no use getting mad about it. If the public should not be disposed to be fair it would still be true that the public has the power and it is our job to try to persuade it to be fair. And one of the best ways in the world to influence the public to be fair and patient and considerate is to be fair and patient and considerate ourselves.

We are all human beings. We think that we are entirely reasonable. We have a conscience; we have a sense of duty; we are fair; we are, anyhow, intelligent, and intelligent self-interest leads generally to the same

line of conduct as conscience and a sense of duty. I hope we would hesitate longer to exact a rate unreasonably high than the public would to impose a rate unreasonably low. I not only hope it, I believe it. But we are all human beings, and it is easy to deceive ourselves. Anyhow, before we censure the public too severely on the score of unfairness, let us be sure we are ourselves beyond criticism.

Our patrons have a disposition to be fair as far as they know. But the difficulty is to get them to know. We know, of course, what is fair to a utility. It is our business to know, but the public doesn't know. The public exercises the power of life and death over thirty billions or more of property in the United States—railroads, street railroads, interurban railroads, telephone and telegraph plants, and water, gas, light and power plants. The public has a general disposition to be fair toward this property, but it knows nothing about it. It is easily misled. It isn't really conscious of its own power, and therefore it is not conscious of its own responsibility. Now it seems to me—and I am voicing only my own personal opinion—it seems to me that the supreme problem in the domain of public relations is for the owners of this thirty billions of property to educate the public—to cause the public to know—to establish in the minds of the public sound opinions and sound theories about how this property should be handled.

> "EVERYBODY makes mistakes. Maybe we do. We must not argue too much nor use too much logic. If we go out to investigate a complaint, we must start in, not with argument, but with sympathy. We must not try to drive a man, but to lead him. If he thinks he has been wronged, he deserves our sympathy, whether he has been wronged or not. He may be suffering from a wrong, or he may be suffering from a wrong impression of his own. In either case he is suffering. We must sympathize with him. He may be wrong, but he isn't wrong so often as we think he is. He may be only half wrong. Now and then he is wholly wrong. We must first find out how he came to fee' so; there is generally some excuse for it. What we want mainly is friends — and only enough money to live on. Friends are the main thing."

The public, I know, is a pretty numerous and busy and unmanageable body, and an adequate knowledge of any one of these different kinds of industry is almost a lifetime work for any man with everything else neglected. What, then, do I mean by "getting the public to know"? What can the public be taught to know? The public cannot know, of course, what the general manager knows or should know. The public cannot know the details of any of these different businesses. But there are a number of general principles, a number of economic laws, a lot of political and psychological truths, all bearing on the proper treatment of public utilities, which the public can be brought fairly well to understand. Even that is a tremendous undertaking, but it seems to me to be a necessary undertaking, however great it may be.

THINGS THE PUBLIC CAN BE TAUGHT

Let me mention some of the things which the public can be taught fairly well to know. The public can be informed, if it is a fact, that the commodity or service which we furnish is a very useful commodity or service, and that we very earnestly desire that it shall be as good and as useful as possible. And if this isn't a fact in each case it should be.

We are monopolies or quasi-monopolies and we are corporations. There is a certain amount of prejudice against monopolies and corporations. The public can come to appreciate that such prejudice is foolish and harmful. A corporation is just a convenient tool which society has created in order to satisfy a need or want. It is no more to be hated than any other tool—no more to be hated than a plow or a spade. We are monopolies only because the needs of the community can best be served by monopoly. A single company can give better and cheaper service in the long run than two or more companies in competition could give. We are monopolies or quasi-monopolies because in the very nature of things we ought to be.

The public can be brought to see that, although we are monopolies, we are, as a matter of fact, more patient and considerate and anxious to please than people engaged in competitive business. The public can be brought to see this, I say, provided it is so, and it ought to be so. Utilities ought to be more anxious to please, more anxious to make their work perfect, than people in other kinds of business.

If a man has been or thinks he has been wronged by his grocer, he gets relief by going to some other grocer, but if he thinks he has been wronged by a monopoly, his anger sinks in and sours, so to speak; and that is mighty bad for the monopoly. We ought, therefore, to do a better job of serving than anybody else. We utility people must be more polite and more kind and more considerate and more reasonable than anybody else, because we have prejudices and erroneous opinions to overcome. Before we can correct erroneous opinions we need to find out what those opinions are and how they came into existence. In other words, we must exercise patience and tolerance and broadmindedness and really get hold of the other fellow's view.

In all our transactions with the public let us remember these things—remember the power of the public—remember the prejudice of the public for which the public is not wholly to blame. Let us remember that the public does not know the facts and the troubles of our business. Let us be patient, tolerant, courteous and fair; let us be more than fair; let us be more than reasonable.

CONVINCE THE PUBLIC OF REASONABLENESS

Remember that it is our duty not only to be fair and reasonable, but to convince, to persuade the public that we are fair and reasonable. Let us meet unkindness with kindness, meet distrust with trust. We must be friendly, anyhow. Any fool can make enemies for himself and his company. It takes a big, broad, kind-hearted man to turn enemies into friends. "Die when I may," said Abraham Lincoln, "I want it said of me by those who knew me best that I always plucked a thistle and planted a flower whenever I thought a flower would

grow." We must plant flowers, not thistles. Almost anybody we deal with needs kindness—the meanest most of all. We must try honestly and hard to see the other fellow's side, to see it as he sees it; to understand how he came to see it so and to feel so about it. And remember it is quite possible for us to be in the wrong.

Everybody makes mistakes. Maybe we do. Very often we are right, very often we may have the power to settle it right; but the thing has been settled only half right if the other fellow hasn't been persuaded that it is right. We must not argue too much nor use too much logic. If we go out to investigate a complaint, we must start in, not with argument, but with sympathy. We must not try to drive a man, but to lead him. If he thinks he has been wronged, he deserves our sympathy, whether he has been wronged or not. He may be suffering from a wrong, or he may be suffering from a wrong impression of his own; in either case he is suffering. We must sympathize with him. He may be wrong, but he isn't wrong as often as we think he is. He may be only half wrong. Now and then he is wholly wrong. We must first find out how he came to feel so; there is generally some excuse for it. What we want mainly is friends—and only enough money to live on. Friends are the main thing.

The people must come to understand the difference between feelings and facts, and the necessity for respecting and being governed by the facts, and the toilsome processes by which facts must be established, and that nobody has a right to an opinion unless it is based on knowledge, that one man who knows is worth a thousand who guess and assume and talk, and that their real friend is not the man who tells them a dozen pleasant lies but the man who will tell them one unpleasant truth.

We ought to be always at work counteracting the influence of the social quacks and the demagogues. This is really our first and fundamental duty—to help sustain the truth, to help sustain sound sociological and economic opinion. The truth is that the institution of private property is necessary. It is right, wise, good, necessary and beneficial; not, I mean, from the standpoint of the rich, but from the standpoint of the poor. You would think that after the experience of Russia further work on this line would be unnecessary, but the sappers and miners are and always will be at work trying to undermine and overthrow the institution of private property.

No Conflict Between Rights and Property

There is no conflict between the rights of man and the rights of property, because the right of property is a right of man. As man is constituted, the most precious thing to him is life—the life of his family and his own life, today—and the next most precious thing—really a part of the same thing—is the means of life for himself and family tomorrow and the next day—that is, property. Property is life, especially under our present intricate and complex industrial system.

Constant war must be made on socialism; upon confiscation, whether open or masked; upon the well-intending dreamers who want to improve the world at the expense of the other fellow, and upon the demagogues with their words and phrases and slogans which mean nothing but confusion. Constant warfare must be made for the institution of private property, not for the benefit of the rich, but for the benefit of the human race. The hatred of the rich or the more prosperous is world-wide and history-wide. In the time of Moses there was need for the commandments "Thou shalt not steal" and "Thou shalt not covet."

It is our duty and it is to our interest and to the interest of our children that the people be taught the simpler economic truths; that no man can get something for nothing; that everything must be paid for in the end; that truthfulness, honesty, fairness and intelligence are the producers of wealth and of general welfare, and that falsehood, pretense, dishonesty, unfairness, ignorance and the disregard of facts are the producers of ruin.

After all, the great task is to spot the demagogue and teach the people how to spot him. Your great enemy and mine, the poor man's and rich man's great enemy, everybody's great enemy in this country, is not capital, not labor, not the corporation, not the monopoly, not the captains of industry, not organized labor, not the labor leader as such—not any of these, but the demagogue, the conscienceless, time-serving, popularity-hunting, vote-hunting demagogue. Able orators and able editors, liars and hypocrites, are boldly assuming this falsehood, eloquently proclaiming that falsehood, advocating any and every false or, still worse, half-true doctrine, regardless of its tendency and result, for which they can find willing ears and in return for which they can gather in votes or subscriptions. In the public interest we must continuously combat and foil them with the unconquerable power of enlightened friendship.

> "OUR patrons have a disposition to be fair as far as they know. But the difficulty is to get them to know. We know, of course, what is fair to a utility. It is our business to know, but the public doesn't know. The public has a general disposition to be fair toward this property, but it knows nothing about it. It is easily misled. It isn't really conscious of its own power, and therefore it is not conscious of its own responsibility. Now, it seems to me that the supreme problem in the domain of public relations is to educate the public — to cause the public to know — to establish in the minds of the public sound opinions and sound theories about how this property should be handled."

Louisville Gas & Electric Ranks Fifty-eighth in 1922 Output

THE Louisville Gas & Electric Company reports an output of 135,569,020 kw.-hr. during 1922. This report, just received, indicates that the company should have been included in the tabulation of generating and distributing companies having an output of more than 100,000,000 kw.-hr. in 1922 which was published in the April 7 issue of the ELECTRICAL WORLD. This company would have ranked fifty-eighth in the tabulation. The peak load, 38,275 kw., took place on Dec. 13, 1922.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

Extent of Ionization in Dielectrics Still Undeterminable

To the Editors of the ELECTRICAL WORLD:

One of the most important of the technical problems which are facing cable engineers at the present time is to determine the weight which should be given to the fact that in some impregnated paper cables the power factor rises with increasing voltage. This phenomenon is known as air ionization or, more briefly, ionization, from the theory that this rise in power factor is due to the formation of ionized air within the insulation.

In 1912 W. Petersen called attention to the fact that air films in a dielectric of specific capacity K are subjected to a stress K times as great as that in the surrounding medium and that ionization may, therefore, occur therein at comparatively low voltages. F. Dubsky, in 1919, measured the dielectric strength of thin air films and was thus able to show the possible conditions under which air ionization was likely to occur in solid dielectrics. In the same year G. B. Shanklin and J. J. Matson measured the air ionization voltage in actual cables by making measurements of dielectric loss and noted the voltage at which the loss began to increase more rapidly that the square of the voltage. The work of these experimenters was amplified in 1921 by C. F. Proos, who adduced experimental evidence to show that the potential required to produce air ionization in a cable depends upon its previous history, as, for example, the various temperatures to which it has been subjected prior to the test. In 1922 J. E. Schrader, and in 1923 J. B. Whitehead, gave some specific data on air ionization in dielectrics which furnished a more exact basis.

So far the work of all these experimenters seems to point to the conclusion that air ionization is the cause of the phenomenon under consideration. In 1922, however, M. Hochstadter wrote a paper contending that the variation of the power factor with voltage is not to be explained by air ionization but by the peculiar properties of the impregnating compound. He did not say what these properties are and brought forward very little experimental evidence to support his theory.

There seems to be a growing idea that there is something wrong about a cable in which the power factor increases with the voltage, and a few cable purchasers have reached the stage where they wish to specify that there shall be no ionization in the cables that they purchase. It, therefore, seems that the time is opportune for taking stock of the known facts.

There appears to be no doubt about the fact that air ionization can take place in a cable and that it shows its presence by an increased power factor at high voltages, It is not so well established, however, that a power factor increasing with voltage really indicates air ionization or that such a rising power-factor characteristic is harmful. Cables which were made some years ago in such a way that air was necessarily entrapped by the layers of paper show a remarkably constant power factor over a wide range of voltages. On the other hand, some modern cables, made in such a way that the presence of air in any appreciable quantity seems to be out of the question, exhibit the so-called ionization phenomenon quite strongly.

However, some modern cables show a power factor which actually decreases with increasing voltage, a phenomenon which would be very hard to explain according to the air ionization theory. This fact suggests that in addition to the air ionization effects there is another phenomenon which influences the power factor at high voltages. The following theory is advanced.

If the impregnating compound contains particles of different specific capacities, those particles which have the highest specific capacity will align themselves in the oil and, if they have lower resistivity, will decrease the resistance of the path between the electrodes. This would increase the power loss as the voltage increases. If the oil is of uniformly low resistivity, the alignment of particles will have no effect on losses and the power factor will, therefore, be independent of the voltage. If, on the other hand, the particles which have the highest specific capacities also have higher resistivity, increasing the voltage will lower the power factor.

There is a certain amount of experimental evidence in favor of this theory which I do not yet feel at liberty to furnish, both because it is inconclusive and because it is intimately related with other matters which I hope to publish in detail at a future date. On the other hand, there are arguments against the theory. For instance, the particles of different specific capacity should more easily align themselves in fluid oil than in jelly. However, those modern cables showing a power factor increasing with the voltage exhibit this phenomenon strongly only at low temperatures, that is, at those temperatures at which the impregnating compound is jelly.

WILLIAM A. DEL MAR,
Habirshaw Electric Cable Company, Yonkers, N. Y. Chief Engineer.

The Power Company's Responsibility for Informing Customers About Circuits

To the Editors of the ELECTRICAL WORLD:

Our attention has been drawn to the appearance in your May 26 issue of a letter received by you from Walter C. Hecker of the Curtis Pneumatic Machinery Company at St. Louis. His letter very clearly states a distressing condition which many builders of small electrical machinery have encountered. I think your journal is to be commended for publishing the letter, and I wish that you might go a step farther and lead a campaign among power companies to the end that their own customers may know accurately what circuit is available in any spot.

Very often we find our customers have been unable to obtain reliable information, and we then take the matter up with the power companies directly. Even in those cases unsatisfactory results have been had, and invariably there is considerable delay in answering our inquiries. It seems that power companies are willing to spend money for advertising and sales effort to increase the number and extend the use of electric appliances, but they handicap this development by failure to make it convenient for their clients to install devices.

The experiences related by Mr. Hecker are not unusual. Unfortunately they are typical of a very frequent occurrence. I believe that this deplorable circumstance could be quickly altered if it were to be brought to the attention of the executives of power companies.

J. H. MEHAN,
Brunner Manufacturing Company, Utica, N. Y. Sales Manager.

Central Station and Industrial Practice

Installation, Operation, Maintenance, Test and Repair of Generation and Distribution Equipment, and Methods of Economically Utilizing Electric Service in Large Industrial Plants

Light-Oil Starting System for Auxiliary Plant

THE new "Cape station" of the Cumberland County Power & Light Company, South Portland, Me., is a steam auxiliary to the company's hydro-electric plants and as such will be idle when the water supply for hydro-electric plant operation is sufficient. As the plant will be shut down several months in the year, it was necessary to equip it with apparatus suitable for starting up from a cold shutdown.

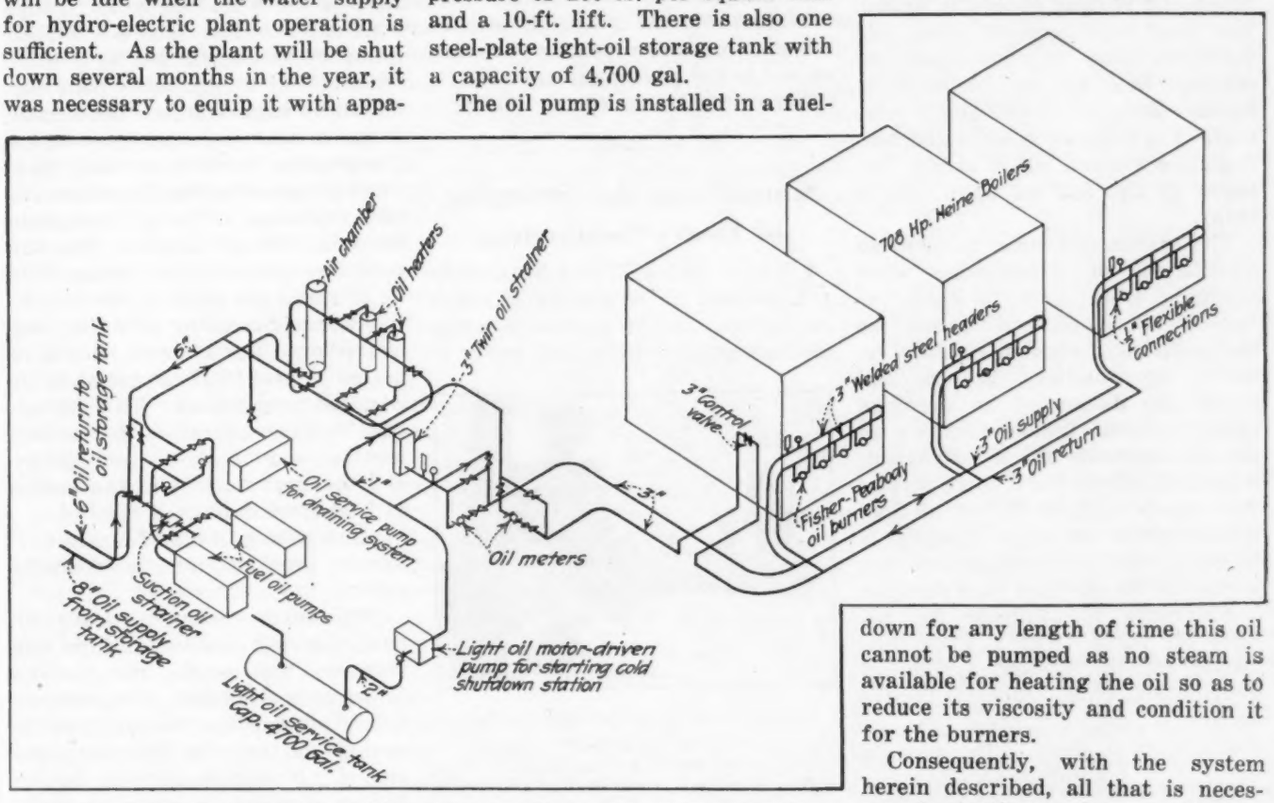
The station contains three 708-hp. Heine parallel-drum water-tube boilers, set 16 ft. high and designed for 300 per cent rating maximum operation. Each boiler is provided with four Fisher-Peabody fuel-oil burners, set in the lower front and in one row about 3 ft. 6 in. above the floor. These burners are of the mechanical type, usually requiring a fuel-oil temperature at the burners of approximately 230 deg. F. and approximately 250 lb. pressure.

Several methods for starting up were considered. The scheme finally adopted was the most convenient, positive and the least expensive from an operating standpoint. The starting-up equipment includes one 3-gal.-per-minute Kinney pump direct-connected to a 1½-hp., three-phase, 60-cycle, 440-volt motor. This unit is designed for a discharge pressure of 200 lb. per square inch and a 10-ft. lift. There is also one steel-plate light-oil storage tank with a capacity of 4,700 gal.

The oil pump is installed in a fuel-oil pump room at one end of the boiler room, and the oil storage tank is in the basement below the pump and can be filled by gravity from tank cars. The regular fuel-oil supply line to the burners is used for serving the burners with light oil when starting up by means of a connection from the pump to the oil-feed mains in pump room. Light gas oil, known as "Solar" oil, is used for this service. This oil contains approximately 19,000 B.t.u. per pound, Baumé 32 to 40, flash test 158 deg. to 160 deg. and viscosity 1.4 seconds at 70 deg. F. by Saybolt Furol.

The general arrangement is shown in the accompanying drawing and indicates the relative position of supply tank, pump and burners.

Since the fuel used for regular operation is a heavy viscous oil averaging 11 deg. to 12 deg. Baumé and requiring heating before it can be pumped and fed to the burners, it follows that when the plant is shut down for any length of time this oil cannot be pumped as no steam is available for heating the oil so as to reduce its viscosity and condition it for the burners.



SIMPLE VALVE MANIPULATION SUFFICES TO START PLANT FROM COLD SHUTDOWN

Consequently, with the system herein described, all that is necessary in starting up from a cold shutdown station is to start the motor-driven light-oil pump and supply the burners with oil at from 125 lb. to 175 lb. pressure through the regular fuel-oil piping system, drawing the supply from the 4,700-gal. supply tank. For this service no heating of oil is necessary. It is essential, however, that when the plant is shut down all fuel oil be drawn from the supply pipes between the fuel oil pumps and the burners so that the oil pipes will be clear and free from heavy oil, ready for starting up with light oil. Suitable and convenient cross-connections are available for drawing away the heavy oil and for feeding the light oil into the system.

these connections being installed in the fuel-oil pump room.

No changes in oil burners or tips are required for burning light oil when starting up; consequently there is no changing of parts for either light or fuel-oil burning.

STEAM PRESSURE RISES OVER 6 LB. A MINUTE

The light oil starting-up system has sufficient capacity to bring any one of the three boilers up to from 75 lb. to 90 lb. steam pressure in about sixty minutes, producing sufficient steam pressure for operating the turbine feed pump and oil heater and supplying steam to the coils in the large fuel-oil storage tank from which the regular supply is drawn. The total time required from cold shutdown start to time when the regular fuel oil is admitted to burners does not exceed ninety minutes. The light oil is not withdrawn from the system, but is simply followed by the fuel oil when this is ready.

The system is simple, requires no alternations or adjustments when changing from light to heavy or regular oil supply other than the manipulation of about five valves, requires no auxiliary heaters and avoids the danger of an overhead gravity system, besides fulfilling all the requirements for a convenient, accessible, efficient and quick service starting-up equipment for oil-fired boilers where the prime essential is to get a cold shutdown station into service in the shortest time possible.

Electricity is available for the light oil pump from a tie-in line tapped off the present system of distribution, while cold water for the boilers is obtained from the city water main, at about 85 lb. pressure.

CHARLES O. LENZ,
Consulting Engineer.
New York, N. Y.

Creosoted Posts and Poles Resist Fire

AN INVESTIGATION to ascertain the relative service life of untreated and treated fence posts subjected to fire hazard that may well be applied to distribution and transmission poles was recently made by the American Wood Preservers' Association.

Creosoted yellow-pine posts can be used advantageously in territories where the fire hazard is great. This is proved by records which have been kept on the Missouri, Kansas & Texas Railroad of the number of treated and untreated posts destroyed by fire during the burning of the right-of-way in 1920 and 1921. The total number of posts in service, the number destroyed by fire and the percentage of total posts in service which were destroyed by fire are shown in the accompanying table.

RELATIVE SERVICE LIFE OF TREATED AND UNTREATED POSTS

	Number	Per Cent
Posts in service:		
Untreated	1,651,333	81.3
Creosoted	378,578	18.7
Total	2,030,911	100.0
Destroyed by fire:		
Untreated	5,795	98.7
Creosoted	76	1.3
Total	5,871	100.0
Per cent of total posts in service which were destroyed by fire:		
Untreated		
Treated		
Total		

FIELD EDITOR ELECTRICAL WORLD.
New York, N. Y.

Simplifying the Stringing of Heavy Conductors

A BACK-BREAKING job is usually entailed in the placing of heavy conductors on the cross-arm after the conductor is pulled and ready to lay up. Usually two men are required on a pole and the job is a hard one. To get away from the heavy lifting the Kansas Gas & Electric Company uses the device shown in the illustration. It is merely a piece of 1-in. steel rod with an eye in one end and the other bent to fit over the cross-arm. A light snatch-block is hooked into the eye, and the ground man hoists the conductor into place.

LIGHT SNATCH BLOCK USED TO LIFT CONDUCTOR INTO PLACE

The rod to which the snatch block is attached is bent to fit around the arm, the end being under the arm.

Beside the insulator in the illustration is shown a cross-arm roller used to prevent the trouble encountered in sagging conductors due to the friction of the wire on the cross-arm. The conductor will run freely over the wooden sheave used. The sheave is mounted in an iron frame with an extension to fit snugly over the cross-arm.

FIELD EDITOR ELECTRICAL WORLD.
Chicago, Ill.

Heat-Treating Piston Rings Electrically

AN ELECTRICAL heat-treating furnace of the continuous-conveyor type has been in successful operation in the new plant of the Inland Products Company in St. Louis. The furnace is special in its design and in the manner of handling the work and is a development of Holcroft & Company.

The interior dimensions of the furnace are 8 ft. long x 4½ ft. high x 1 ft. 10 in. wide. There is a 4½-in. lining of fireclay backed by 9 in. of "Silocel," with ¼-in. boiler plate supported by angle irons on the outside. It has an electrical capacity of 92 kw. The heating elements are made up of three groups of nickel-chromium ribbons connected in Y to a three-phase, 60-cycle, 230-volt circuit. The furnace was designed for heating 1,800 lb. of metal per hour to 900 deg. F., the charge consisting of 3,000 rings and arbors. One kilowatt-hour is required to heat 20 lb. of metal to the required temperature. This furnace has been in operation for several months and is quite satisfactory, and the improvement in the quality of heat-treated rings is marked.

In speaking of this furnace C. C. Miner, president of the company, says:

"This furnace is automatically controlled, giving absolute uniform temperature, and as the speed of the conveyor is absolutely under our control, it is needless to say that the quality of the ring is greatly improved. It is quite obvious that the human element is entirely absent from both the heat-treating solution and the length of time under old methods that rings were submerged. Naturally the production is largely increased, and the efficiency of the plant is also increased because of the absence of the open heat-treating furnace creating an intense heat in the rooms, whereas with this furnace there is no perceptible rise in temperature ten feet away from the furnace. We consider this a much more economical method of manufacture than the old plan, yet one insuring a higher quality of product and enabling us to guarantee uniformity in tension."

FIELD EDITOR ELECTRICAL WORLD.
Chicago, Ill.

Extracts from an Operating Code

BY FIELD EDITOR ELECTRICAL WORLD
New York, N. Y.

Mercury-Arc Rectifier Sets

WHEN starting mercury-arc rectifiers, operating the tube on short circuit for five to ten minutes to warm up reduces the danger of puncture from static accumulation within or on the tube, according to the operating code of the Philadelphia Electric Company. Static on the tube, brought in on the direct-current arc circuit, will often cause discharges in the tube from the cathode to the starting anode, or from anode to anode, or across the static dischargers. When such discharges occur the arc may be carried over to a starting anode and should be stopped by shaking the tube.

If the tube is operated on the exciter for more than one minute before plugging in the primary, the mercury thus vaporized will condense around the anodes and thereby necessitate running the tube a much longer period on short circuit to get it thoroughly dried out, and mercury in the vicinity of the anodes is likely to puncture the seals.

The time of cutting the water supply on or off will vary with the room temperature. For instance, if the room temperature is between 90 deg. and 100 deg. F., it may be necessary to apply the water shortly before the time for starting in order to get the best oil temperature for that particular tube. If the room temperature is between 50 deg. and 70 deg., it may not be necessary to apply the water until some time after the tube has been started, and the operator may be able to shut off the water some little time before the end of the run.

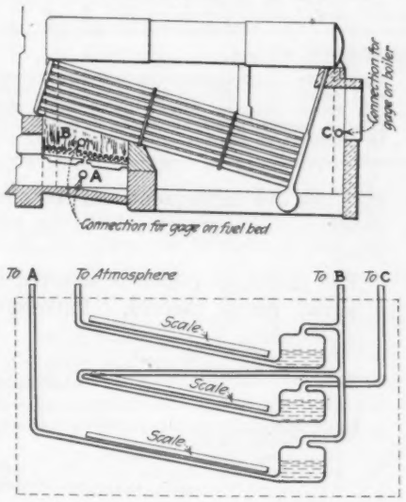
Trouble is sometimes experienced in getting a tube started in that it may operate on short circuit but will not carry the load, or will drop out every time the short circuit is removed. This is usually due to low vacuum, low temperature or to the transformer dashpot being too stiff.

If the tube will not carry the load after several attempts to start from short circuit, it is allowable to remove the short-circuiting plug and, after separating the coils of the constant-current transformer, start the tube directly on the circuit. This may start tubes operating when the vacuum is low, but a tube in this condition will not last long.

When a tube is too cold or its vacuum too low the mercury condenses so rapidly that the arc cannot be maintained while the constant-current transformer secondary coil is taking up its operating position. Therefore, when the short circuit is removed the arc goes out. Excessive stiffness of the transformer dashpot may cause a similar result. This stiffness may be corrected by opening the dashpot bypass valve on starting.

Locating Draft Gages and What Their Readings Mean

SIMPLE and explicit directions regarding the use and proper location of draft gages of the oil type are given in the operating code of the Philadelphia Electric Company. These directions are given below.



PROPER POINTS FOR CONNECTING DRAFT GAGES IN BOILER SETTINGS

As will be seen from the accompanying illustrations, the lower end of the bottom tube is connected over the fire at point *B* and the upper end of the tube is connected under the fire at point *A*. The liquid level of this tube indicates the difference in pressure between the wind box and the fire box. The lower end of the top tube is connected over the fire, at point *B*, while the upper end is open to the atmosphere. This shows the difference between the pressure in the fire box and the atmosphere. A negative pressure of not over $\frac{1}{10}$ in., indicated by a reading below zero, should be maintained in the fire box. This is essential, as a greater negative pressure causes more infiltration of cold air through the doors and leaky silting of the gases, thereby increasing the velocity of these gases as they pass through the boiler.

This results in a lowering of the boiler efficiency by decreasing the amount of heat absorbed by the boiler.

The lower end of the middle tube is connected to the last pass of the boiler or economizer nearest to the breeching at point *C*, while the upper end is connected over the fire at point *B*. The difference in pressure indicated by this tube is the drop through the boiler passes.

With a clean boiler and a normal fire, for any given rating, there will be a definite drop through the boiler corresponding to the best operating conditions. The values for various ratings are determined by tests and specified in the running schedule furnished with each boiler. A greater drop than specified shows either excess air through the fire or clogged passages due to clinker formation and soot. A smaller drop than specified shows either insufficient air to the fire or damaged baffles.

At any given rating excess air increases the volume of gases to be handled, thereby requiring a greater drop in pressure to force it through the boiler. If the boiler is dirty, a greater drop in pressure is necessary to force the normal quantity of the gases through the restricted gas passages. Insufficient air or damaged baffles require a smaller drop in pressure.

PRECISION DRAFT GAGES

The "precision" draft gage consists of three bellows-type pressure and vacuum gages, calibrated to read in inches of water. These are connected to the boiler at points *A*, *B* and *C*. The meter at *A* indicates the pressure under the fire. The one at *B* functions the same as the top tube of the oil-type gages. On the meter connected at *C* a higher or lower reading than specified indicates the same conditions of fire or boiler cleanliness as the middle tube of the first system.

The readings of the "Precision" gage can be compared directly with those of the oil-type meter by making the subtraction which in the oil type meter is obtained by the differential connection of the tubes.

Emergency Patrol of High-Tension Lines

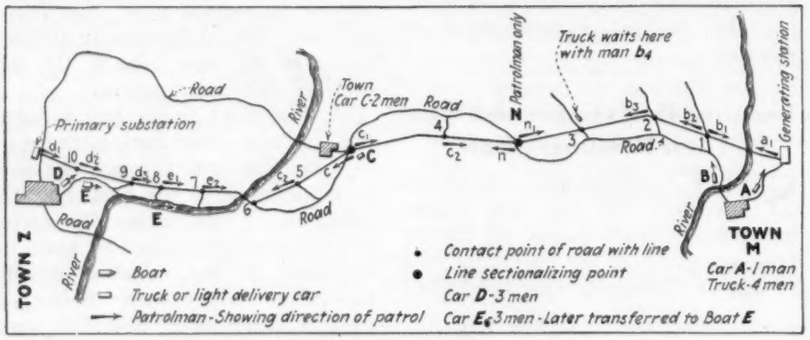
NO MATTER what care may be exercised in the maintenance of a circuit, a lightning stroke may shatter an insulator or cut a conductor in the span, a tornado may cross and twist a structure or tower out of shape, a bird may short-circuit wires and burn one in two, insulator strings may pull apart and other things happen which may cause an interruption of service and the switch at the substation cannot be made to hold. When this happens on the Alabama Power Company's system an emergency patrol is started at once. The emergency patrol as used may be divided into three major operations, as follows: (1) Sectionalization, for determining section of line in which trouble lies; (2) patrol, for locating trouble; (3) correction, involving movement of men and materials to location for repairing trouble.

There are physical limitations upon the speed with which service can be restored after an outage. Sectionalization involves the movement of various patrolmen stationed along the line to the switch or test loops for opening and closing in the process of testing. Perhaps the patrolman may be out on the line patrolling or doing repair work somewhere, or, at night, the men have to be aroused, and time is consumed in dressing and reaching the location of the various switches. These conditions and possibilities bring about certain delays which are difficult to overcome and, though sectionalization and patrol operations may for the most part begin at the same time, there is an overlapping of effort in a large number of instances which spells minutes in completion of repairs.

The time necessary for correction depends on the nature of trouble and the distance between the truck with men and the fault when it is found. For minor cases of repair two men are usually sufficient, whereas wire breakage or structure failure requires a larger crew. There have been instances where a number of towers have been blown over by a cyclone and conductors had to be restrung temporarily on trees along the right-of-way by large forces of men moved to the scene of trouble from a distant point. Fortunately, such cyclones are infrequent and the time consumed in correction is fairly constant.

The patrol operation is affected by a great many factors. Patrolmen must be stationed close to small communities where housing and supplies are available. The number of men along the line will be determined by the length of circuit, contour of country and transportation conditions. Furthermore, consideration must be given to balance between yearly operating costs and losses arising from outages, service requirements, good will, etc. Having one patrolman in each section, say 18 miles or 20 miles in length, would represent a minimum of expenditure for line operation, but, if trouble occurred, the time for patrol operation might approximate five hours; whereas by placing men 10 miles apart the time would be reduced to less than one hour. The most economical arrangement is not an easy one to determine and the answer lies in the nice judgment of those directing a company's policy.

The accompanying sketch will serve to aid in the discussion for a typical instance of the various phases of an emergency patrol. *M* and *Z* are towns of moderate size where there is employed a regular crew of four or five men to maintain the local distribution system. At these locations there is available a truck and a car for transportation. *C* is a small village where two men and a car are required for regular patrol of transmission line and for upkeep of local circuits. At *N* there is a sectionalization point, and a patrol-



SCHEDULE FOR EMERGENCY PATROL

Instructions like this are given for carrying on emergency patrol for each section of line on Alabama system. They are put in the hands of the local manager, who is required to rehearse them with the men under him, so that they are always informed and ready to carry on the operations without delay. On the actual instructions identifying points, markings, etc., are indicated to make them readily understandable.

TYPICAL LIST OF TOOLS AND EQUIPMENT REQUIRED FOR EMERGENCY PATROL

1. Each patrolman must have the following personal tools:
   - Pair 8-in. pliers, screwdriver.
   - Pair connectors for No. 10 to No. 2 wire.
   - 8-in. monkeywrench, safety belt, complete.
   - Pair climbers, complete.
2. Sylacauga substation:
   - Two test sets, complete with weatherproof covers.
   - Two extra test set batteries No. 752.
   - Two three-cell flashlamps, complete.
   - Two extra three-cell flashlamp batteries.
   - Two extra flashlamp bulbs.
   - Two Dietz-Vesta oil lanterns, complete.
   - Two carbide miner's lamps, complete.
   - Two carbide pocket containers.
   - Two water pocket containers.
   - Two cans carbide.
   - Company key for each patrolman, hand axe.
   - Woodman's single-blade axe.
   - Handsaw No. 7, carpenter's brace.
   - Two $\frac{1}{2}$-in. x 18-in. bits, two $\frac{1}{16}$-in. x 18-in. bits, $\frac{7}{16}$-in. x 12-in. bits, blowtorch.
   - 12-in. monkeywrench.
   - Pair splicing wrenches for No. 2/0 copper sleeves.
   - 8-ft. Johnson ground pole.
   - Six Johnson grounds, complete.
   - Two 25-ft. ground chains with 15-ft. $\frac{3}{8}$-in. sash cord on one end.
   - Two New Haven clamps for No. 2/0 wire.
   - Two New Haven clamps for No. 4 wire.
   - Pair Klein telephone slack blocks with 50 ft. $\frac{3}{8}$-in. sash cord.
   - Hand line, 150 ft. $\frac{1}{4}$-in. manila rope.
   - Set 4-in. blocks with 300 ft. $\frac{1}{4}$-in. manila rope.
   - Set 6-in. blocks with 300 ft. $\frac{3}{4}$-in. manila rope.
   - 4-in. snatch block, 6-in. snatch block.
   - Long-handle shovel, long-handle spoon.
   - Digging bar, straight spade.
   - Short handle shovel or "billy," four brush hooks, scythe, hoe, two pike holes.
3. Goodwater patrolman:
   - Test set, complete with weatherproof covers.
   - Extra test-set battery.
   - Three-cell flashlamp, complete.
   - Extra three-cell flashlamp battery.
   - Extra flashlamp bulb.
   - Dietz-Vesta lantern, complete.
   - Carbide miner's lamp, complete.
   - Carbide pocket container.
   - Water pocket container.
   - Two lb. can carbide, company key, hand axe, woodman's singleblade axe, hand saw No. 7, carpenter's brace.
   - Two $\frac{1}{2}$-in. x 18-in. bits, two $\frac{1}{16}$-in. x 18-in. bit, $\frac{7}{16}$-in. x 12-in. bits, blowtorch, 12-in. monkeywrench.
   - Two New Haven clamps for $\frac{7}{16}$-in. messenger.
   - Two New Haven clamps for No. 4 copper wire.
   - Pair telephone slack blocks with 50 ft. $\frac{3}{8}$-in. sash cord.
   - Hand line, 100 ft. $\frac{1}{4}$-in. manila rope.
   - Set 4-in. blocks with 200 ft. $\frac{1}{4}$-in. manila rope;
   - Set 6-in. blocks with 300 ft. $\frac{3}{4}$-in. manila rope.
   - 4-in. snatch block, 6-in. snatch block.
   - 8-ft. Johnson ground pole.
   - Three Johnson ground clamps, complete.
   - Two 25-ft. ground chains with 15 ft. $\frac{3}{8}$-in. sash cord on one end.
   - Two brush hooks, hand grass blade, hoe, short-handle shovel or "billy."

man is stationed there ready for call at all times.

The emergency patrol operations have been carefully studied, and instructions have been issued to the patrolmen and each crew member as to his part of the work. Each man carries a telephone test set, climbing tools and night lighting equipment consisting of a lantern and pocket flashlamp and, when on patrol, is required to attach the test set and report to nearest substation every half hour for orders. Boxes containing repair tools and materials are ready at truck headquarters for immediate loading, and stocks of insulators and wire are kept in booths along the line. The men are kept familiar with road conditions and standard instructions by occasional test patrols which correspond to the fire drills of our boyhood days.

An emergency patrol is automatically set in motion when the station operator advises points along the line that the switch cannot be made to hold and the line is in trouble. Crews at *M* and *Z* are mobilized as rapidly as possible, and immediately car *A* moves to the generating station and man a_1 starts patrol to river. Truck *b* with crew journeys toward station 1. At upper end of line man d_1 begins patrol at once and car *D* starts for station 10. Truck *E* moves toward station 9.

In the meantime the substation operator calls upon locations *N* and *C* for sectionalization. Sectionalization and test are performed in the order in which the respective crews are able to reach test loops and operate them. If loops at *C* are first opened and upon energizing the line the test shows circuit clear, the trouble is beyond *C*, and crews from locations *M* and *N* are ordered to return home, and men at *C* are told to begin patrol to river. If loops at N are first opened and line tests indicate trouble beyond *N*, then when loops at *C* are opened and tests made, it is definitely established whether trouble is between *N* and *C* or *C* and *Z*. If fault lies between *N* and *C*, the operator advises these respective crews to patrol this section and orders crews from *M* to move to *N* and receive instructions. If the opening of loops at *N* does not clear "short" on line, fault lies between *M* and *N*, and then man at *N* is instructed to move toward *M*.

From a study of the sketch the movement of the truck and the cars can be traced along this section, depositing men at various stations for patrolling as the arrows indicate. After patrolmen have been distributed the truck and driver wait at the booth for news as to description and location of trouble. If correction of trouble will require other men besides himself and the patrolman, truck driver will arrange to pick up necessary help along line and hasten to the location of the fault. In the section *C-Z* it has been necessary to use a boat on the river instead of a truck because the low lands along that portion of the line are frequently marshy from high water.

The efficiency with which an emergency patrol operation is completed depends upon the thorough knowledge of each and every patrolman of his part of the work and upon the speed and effort he puts forth in doing his job exactly according to instructions. Proper functioning of all equipment is of vital importance. A defective test set may delay restoration of service an hour or more. Lack of oil in lanterns or a bad battery in a flashlamp spells longer outage and additional losses of many dollars to the customer in production and to the utility company in revenue. Therefore employees charged with these responsibilities should realize the great importance of the small details which affect completion of patrol, and the inspectors should maintain a watchfulness of patrol equipment.

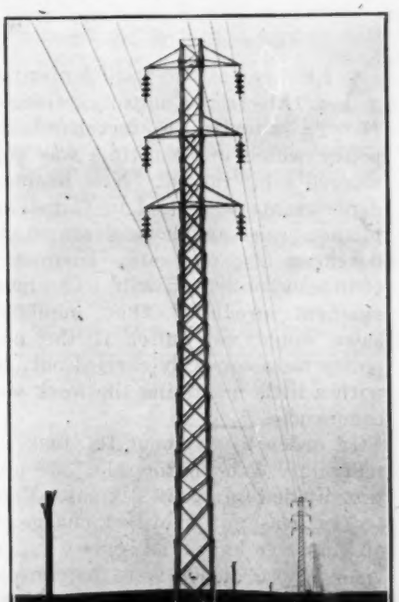
G. H. MIDDLEMISS,
Superintendent of Distribution and Maintenance.
Alabama Power Company,
Birmingham, Ala.

TYPICAL LIST OF REPLACEMENT MATERIALS TO BE KEPT IN EMERGENCY BOOTHS

1. Sylacauga substation:
   - 1,000 ft. No. 2 bare copper wire.
   - 500 ft. No. 4 bare solid-copper wire.
   - Six Thomas 44-kv. pin-type insulators.
   - Six O.B. 44-kv. pin-type insulators.
   - Sixty-three O. B. suspension units.
   - Twelve No. 2 copper splicing sleeves.
   - Twelve No. 4 copper splicing sleeves.
   - Three 7-in. Lee pin stands.
   - Three 15-in. Lee pins, three 10-in. Lee pins.
   - Three standard 44-kv. creosoted cross arms.
   - Three standard bow braces.
   - Three ¾-in. x 18-in. through bolts with nuts.
   - Three ¾-in. x 14-in. through bolts with nuts.
   - Three ½-in. x 6-in. carriage bolts.
   - 500 ft. 7/16-in. messenger wire.
   - Twelve three-bolt clamps for 7/16-in. messenger.
   - 200 ft. No. 10 copper-clad telephone wire,
   - 12 No. 10 copper sleeves.
   - Standard telephone cross-arm.
   - 16-in. x ⅝-in. through bolt.
   - Two wood telephone pins.
   - Telephone transposition bracket.
   - Twelve telephone insulators.
   - Six ½-in. x 5-in. lag screws.
   - Two telephone metal pins for transposition brackets.
2. Hollins Booth—Pole No. 193:
   - Two Thomas 44-kv. pin-type insulators.
   - Two O. B. 44-kv. pin-type insulators.
   - 200 ft. No. 2 bare solid-copper wire.
   - 200 ft. No. 4 bare solid-copper wire.
   - Four No. 2 copper sleeves.
   - Four No. 4 copper sleeves.
   - 7-in. Lee pin stand.
   - 15-in. Lee pin. 10-in. Lee pin.
   - ¾-in. x 14-in. through bolt, ¾-in. x 18-in. through bolt.
   - 7/16-in. x 14-in. through bolt.
   - Three ½-in. x 4½-in. lag screws.
   - One hundred ft. No. 10 copper-clad telephone wire.
   - Six telephone insulators.
   - Six No. 10 copper sleeves.
   - Two telephone pins, wood, 1½-in. x 9-in.

Steel-Pole Line Built for $4,700 per Mile

THE transmission line shown in the accompanying photograph is 33 miles in length and transmits power at 66,000 volts from the recently completed Don Pedro power plant of the Modesto-Turlock Irriga-



DOUBLE CIRCUIT LINE HAS CARRYING CAPACITY OF 40,000 KVA.

tion District to the city of Turlock, Cal. The average cost per mile for labor and material was $4,700. The labor cost per mile in level country was as follows:

Digging holes and placing foundations	$212.00
Distributing material	77.60
Bolting up and erecting poles	99.20
Stringing wire	141.20
Miscellaneous	34.80
Total	$574.80

In the mountainous section, which comprised approximately one-third of the distance, the labor cost per mile was nearly double this figure. The spans in the open country vary from 500 ft. to 700 ft. The steel poles are 3 ft. 6 in. square at the base, 1 ft. 9 in. at the top and 60 ft. high. Two No. 1/0 stranded copper circuits are carried on suspension insulators.

R. W. SHOEMAKER,
Superintendent Electrical Department.
Turlock Irrigation District,
Turlock, Cal.

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Merchandising on a Good-Will Basis*

How a Central-Station Company Improved Its Service by Personal Attention to Customers and Realized a Profitable Increase in Appliance Sales

By William F. Moses
Commercial Manager Empire Gas & Electric Company, Auburn, N. Y.

A FEW years ago the Empire Gas & Electric Company, Geneva, N. Y., adopted a merchandising policy which at that time was considered a bit radical. New business departments were told to forget appliances sales and concentrate on the development of our customers' confidence and good will. The management predicted that appliance sales would not suffer if the new policy were correctly carried out. So with a little misgiving the work was commenced.

In order to go about the task intelligently and thoroughly, our city was divided into four sections. Each section was put in direct charge of an employee known as service supervisor whose duties were to canvass each home in his territory, adjusting appliances and instructing the housewife, maid, cook, and in some cases the husband, in their proper use. Instruction on reading meters and computing bills and information on the newest labor-saving devices and other points were given.

No direct effort was made to sell merchandise, but a card file was kept with a record for each customer. At frequent intervals literature of a sales nature was mailed to those customers whose records indicated they might be "prospects." Nearly a year was necessary to complete our first canvas, when to our surprise we found that the merchandising business far exceeded the previous year's record.

In addition, a stock-selling campaign was conducted, the entire issue being sold in five days. The following year a similar but larger issue was sold in three days, proving without a doubt that we were accomplishing much in building for the future. Since that time the service work has been continued successfully, with a little more direct sales effort in conjunction.

Sales Campaigns

During the past two years a schedule of sales campaigns on the major appliances has been carried out, and our service supervisors have in every case supplied 90 per cent of the prospects. Each man has his own business cards, which are used liberally, and rarely does a day pass without a request from our customers that a representative of the company call at his or her home. Invariably such a call means an appliance sale.

This effort is being enlarged this year among the manufacturing plants of the city with a power and an industrial engineer from our company working along similar lines.

It is true that if you look for trouble you will find it, and we are looking for it, finding it and earnestly trying to correct it in the belief that service rendered faithfully and honestly earns its own reward in greater returns to the company. With the increasing number and uses of appliances, every call for service means the possibility of a future customer. They should not be overlooked.

Some may say, "Sell your appliance first and then give service." Why not give service first, sell your merchandise second, and give it service also? Service is the "S" which when crossed with the two marks of confidence and good will makes the sign of the dollar.

Central stations of today with their earnest endeavor to give the best possible service should set an example as modern merchandisers of appliances.

During the past few years we have seen a number of companies disband their selling organizations and surrender their appliance departments to less experienced hands. We have recently seen these same companies getting back into the appliance game, reorganizing their sales staffs and launching forth in an endeavor to recover the steady increase in gas and electric sales which they frankly admit was being lost.

The merchandising of appliances by central-station companies is here to stay. We owe it to our customers to promote the sale of only the best and most efficient devices for home comfort and labor saving. Our customers are instinctively looking to us for advice on such matters, and we must be in a position to serve them well. This is no reflection whatever on the electrical contractor-dealers, the master plumber or the home-furnishing merchant. There is room for all, and good, clean competition is always an asset. The electric and gas utility has, however, a genuine selling task ahead to educate the electrical contractor-dealer, the plumber and all other merchants dealing in appliances to our ideal of service.

The year 1923 shows every sign of being a record breaker as far as domestic appliance sales are concerned. Business is good, non-employment is forgotten, wages are on the upward trend along with the price of all materials, home-building projects are rapidly taking form—all of which means a greater market for our products. Real merchandising will produce a new volume of sales in 1923.

But let us not for one minute think that this business is going to come to us without an effort. If the public has been "sold" on our sincere effort to serve well and on our attitude of good will, then the time is ripe for some "honest-to-goodness" new business effort. And, after all, there is only one way to obtain business, and that is to go after it. Our customers are waiting to be told about the appliances and their usefulness.

A carefully worked-out program of domestic sales campaigns on the major appliances, such as flatirons, ironers, electric cleaners, clothes

*From a paper presented at the Commercial Section meeting of the Empire State Gas and Electric Association at Briarcliff Manor, N. Y., June 28 and 29.

washers, dishwashers, modern lighting and so on, is very essential.

In the electric appliance field new devices in ever-increasing number are being perfected and find a ready sale. The modern electric laundry iron is one of our best friends and should be sold in every newly wired home as soon as the meter is installed. The electric washer market is striding forward, and every one sold opens the way for the lately improved and very practical ironer. Electric household refrigerators also offer us an increased load which in time can be developed to a marked degree.

We who are in the commercial field of the central-station business have a great responsibility and likewise a great opportunity. We are more than appliance sales promoters. We are rendering a service to the public, and every time we sell an appliance we first sell service. With such an attitude the appliance department cannot fail.

Standardization of Incandescent Lamp Voltages

THE increasing use of gas-filled tungsten lamps, a rapid falling off in sales of carbon lamps and satisfactory progress toward standardization of lamp voltages were cited in the report of the N. E. L. A. lamp committee (W. W. Freeman chairman) presented at the annual convention in New York, June 4-9. Summarized, the report said:

The demand for the more important sizes of vacuum and gas-filled tungsten-filament lamps during the past three year is shown in Table I.

While only a little more than 20 per cent of the total number of tungsten-filament lamps sold in 1922 were of the gas-filled type, their aggregate wattage was 44.4 per cent and aggregate lumens 52.4 per cent of the total.

The 40-watt vacuum lamp continues to be the most popular size, with the 25-watt a close second. The 50-watt is now a close third and has been increasing in popularity every year. The 75-watt and 100-watt lamps continue to be the most popular of the gas-filled type.

There were less than 3,000,000 carbon lamps sold in 1922, compared with 6,000,000 in 1921 and 9,000,000 in 1920. It is apparent that the carbon lamp will soon disappear from the market; it is now a negligible item in the total lamp sales.

The total sales of lamps during the years 1907-1922 are shown graphically in Fig. 1. The average increase during the past fifteen years has been a little over 9 per cent each year.

It will be seen that the percentage of the 115-volt group of lamps is still increasing and that of the 230-volt group decreasing.

The distribution of street series lamps by sizes during the past three years is shown in Table II.

The committee in its last two reports suggested that member companies consider the undesirability of using street series lamps of candlepower less than 60. While it will be noted from the above figures that the percentage of these lamps has slightly decreased during the past three years, the committee felt that it should again call this matter to the attenion of member companies. Lamps producing less than 600 lumens are inadequate and uneconomical under ordinary street-lighting conditions, so it was suggested that attention be given to the advisability of substituting a larger-size lamp in place of the great number of low-candlepower lamps now in use.

The distribution of lamps by ampere ratings during the past three years is shown in Table III.

It will be noted from the table that about 70 per cent of all lamps are operated on 6.6-amp. circuits, and, in the interest of standardization, it is suggested that member companies, whenever making any changes or additions to their street-lighting equipment, should use apparatus designed for this amperage.

Considerable progress has been made during the past year in the use of standard-voltage (110, 115 and 120-volt) lamps. In 1922 lamps of these three voltages constituted 91½ per cent of the total 115-volt group, compared with 87.2 per cent in 1921 and less than 47 per cent in 1913, when this matter was first agitated.

The data showing the trend during the past ten years toward the adoption of standard-voltage lamps is shown graphically in Fig. 2.

The activities of the sub-committee on voltage standardization during the past year have been directed toward the revision of the booklet of central station voltages which has been heretofore published by the incandescent lamp manufacturers. In it it is shown that standardization and unification of lamp voltage have been accomplished in respect of over 80 per cent of the electric lighting business of the country.

The report showed that the demand for 110-volt lamps was 26.3 per cent of the total, for 115-volt lamps 39.3 per cent and for 120-volt lamps 25.9 per cent.

These data confirm the trend, above indicated, toward heavy concentration at 115 volts. Investigation showed that there are 164 communities of five thousand people or more which either have not standardized as to voltage or in which unification of voltage for the entire community is not completed. If they were all completely standardized and unified, the percentage of complete standardization and unification for the country would rise from 83.5 to 98.0.

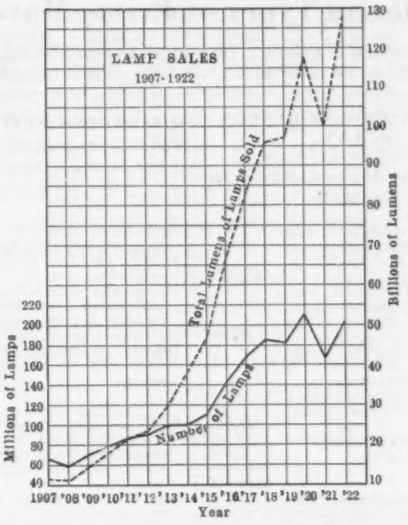

LAMP SALES
1907-1922
Total Lumens of Lamps Sold
Number of Lamps
Millions of Lamps
Billions of Lumens
Year
1907 '08 '09 '10 '11 '12 '13 '14 '15 '16 '17 '18 '19 '20 '21 '22

FIG. 1—LAMP SALES, 1907-1922

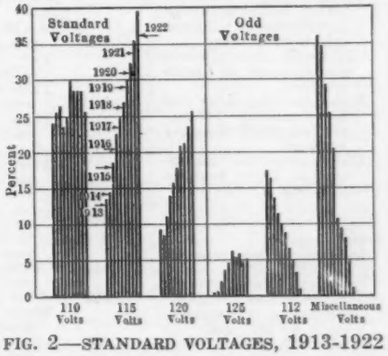


FIG. 2—STANDARD VOLTAGES, 1913-1922

TABLE I—PER CENT DEMAND FOR TUNGSTEN LAMPS, 1920-1922

Vacuum type:	1920	1921	1922
Sign	5.8	6.1	5.7
15 watts	5.5	3.5	4.5
25 watts	18.8	17.7	18.6
40 watts	20.1	20.2	19.5
50 watts	11.9	14.7	15.3
60 watts	12.3	13.1	12.6
Street railway	3.2	2.6	2.3
Miscellaneous	2.1	1.5	1.1
Total vacuum type	79.7	79.4	79.5
Gas-filled type:	**1920**	**1921**	**1922**
50 watts	1.8	1.4	1.5
75 watts	5.9	6.6	6.4
100 watts	6.3	6.5	6.4
200 watts	2.3	2.2	2.4
300-1000 watts	1.2	0.9	0.8
Street series	1.3	1.9	1.4
Miscellaneous	1.5	1.1	1.6
Total gas-filled type	20.3	20.6	20.5

TABLE II—PER CENT DISTRIBUTION OF STREET SERIES LAMPS, 1920-1922

Size	1920	1921	1922
Under 600 lumens	13.9	13.8	12.4
Under 600 lumens	22.5	23.9	23.0
Under 800 lumens	11.7	9.4	9.5
Under 1,000 lumens	27.3	26.1	24.1
Under 2,500 lumens	10.6	11.8	12.8
Under 4,000 lumens	7.6	10.1	10.1
Under 6,000 lumens	5.5	4.3	6.4
Under 10,000 lumens	0.9	0.6	0.7

TABLE III—PER CENT DISTRIBUTION OF LAMPS BY AMPERAGE

Rating, Amp.	1920	1921	1922
4.0	13.0	9.8	9.0
5.5	8.5	8.7	7.8
6.6	57.5	61.7	60.1
7.5	13.7	11.3	12.0
Compensator (mostly 6.6)	7.3	8.5	10.3

Comparative Costs with Different Types of Prime Movers Used in Ice Manufacture

The assumed plant on which this table is based is a 100-ton high-pressure fresh-water plant, with 1,600 300-lb. cans, 35,000 feet of 1½-in. pipe, four-can lift, automatic fill and 10,000-ton season ice storage; production, 32,000 tons per year.

ELECTRIC PLANT Two Compressor Units, Synchronous-Motor-Driven	
Ice-making machinery and water system, f.o.b. factory	$79,000
Freight, erection, ammonia, electric wiring and miscellaneous	15,000
Synchronous motors and switchboard, erected	12,000
	$106,000
Buildings, insulation, etc.—engine room, tank room, daily ice storage and office, at 11½ cents per cu.ft.	$34,000
Insulation of ice tank, daily storage, etc.	10,500
10,000-ton season ice storage, including insulation, elevator, doors, etc., at $9.80 per ton, complete	98,000
	142,500
Total investment, exclusive of land	$248,500
OPERATING COST PER YEAR	
Labor:	
One chief engineer, at $225 per month	$2,700
Two watch engineers, at $175 per month	4,200
Three ice pullers, at $30 per week	4,680
Power:	
Yearly average, 46 kw.-hr. per ton, including storage; 32,000 tons, at 1.5 cents per kw.-hr. average	22,100
Oil, waste, ammonia and miscellaneous, at 7 cents per ton	2,240
Water for ice-making and tower make-up, 500 gal. per ton, at 10 cents per 1,000 gal.	1,600
Maintenance on machinery, at 2 per cent on $106,000	2,120
	39,640
Fixed charges:	
Interest, 6 per cent on $248,500	$14,910
Depreciation on buildings, 3½ per cent on $142,500	5,000
Depreciation on machinery, 6 per cent on $106,000	6,360
Insurance, taxes and miscellaneous, 1½ per cent on $248,500	3,720
	29,990
Total operating cost	$69,630
$69,630 / 32,000 (tons) = $2.17 per ton	

UNIFLOW-ENGINE-DRIVEN PLANT Two Compressor Units, Uniflow Engine-Driven Generator for Auxiliaries	
Ice-making machinery and water system, with steam condenser and auxiliaries, f.o.b. factory	$98,000
Freight and erection, ammonia, salt, electric wiring, steam and exhaust mains (covered)	19,100
Two 200-hp. boilers, water tube, 165 lb. steam, 150 deg. superheat, with superheaters, stack, brickwork and boilerfeed pump, erected	22,000
100-kva. generator connected to uniflow engine	7,800
	$146,900
Buildings, insulation, etc., engine room, tank room, daily ice storage, boiler room and office, at 11½ cents per cu.ft.	$36,500
Insulation of tank, daily ice storage, etc.	10,500
10,000-ton season storage, including insulation, elevator, doors, etc., at $9.80 per ton, complete	98,000
	145,000
Total investment, exclusive of land	$291,900
OPERATING COST PER YEAR	
Labor:	
One chief engineer, at $275 per month	$3,300
Two watch engineers, at $175 per month	4,200
Three ice pullers, at $30 per week	4,680
Three firemen, at $36 per week	5,616
Fuel:	
Average 2.8 i. hp. per ton ice, including storage, at 14.5—steam per i. hp.-hr. equals about 15½ tons ice per ton coal—32,000 ÷ 15½ = 2,060 tons coal, at $4.50	9,300
Oil, waste, ammonia, supplies, etc., at 9 cents per ton	2,880
Water for ice-making purposes and boiler and cooling tower make-up, 600 gal. per ton, at 10 cents per 1,000 gal.	1,920
Maintenance on machinery, at 3 per cent on $146,900	4,407
	$36,213
Fixed charges:	
Interest, at 6 per cent on $291,900	$17,514
Depreciation on buildings, 3½ per cent on $145,000	5,075
Depreciation on machinery, 8 per cent on $146,900	11,752
Insurance, taxes and miscellaneous, 1½ per cent on $291,900	4,378
	38,719
Total operating cost	$74,932
$74,932 / 32,000 (tons) = $2.34 per ton	
(Equivalent to electric power at 1.86 cents per kw.-hr.)	

OIL-ENGINE-DRIVEN PLANT Full Diesel Type (Busch-Sulzer Type or Equal), Two Compressor Units, One Generator Unit	
Ice-making machinery and water system, f.o.b. factory	$78,000
Freight, erection, ammonia, salt, wiring, etc.	14,000
Two oil-engine units for driving ammonia compressors by belts, erected, including oil piping, tanks, etc.	35,000
100-kva. generator, direct-connected to 150-hp. oil engine	20,000
	$147,000
Buildings, insulation, etc.—engine room, ice-tank room, daily ice storage and office, at 11½ cents per cu.ft.	$37,000
Insulation of ice tank, daily storage, etc.	10,500
10,000-ton season ice storage, including insulation, elevator, doors, etc., @ $9.80 per ton, complete	98,000
	145,500
Total investment, exclusive of land	$292,500
OPERATING COST PER YEAR	
Labor:	
One chief engineer, at $275 per month	$3,300
Two watch engineers, at $175 per month	4,200
Two extra men, at $36 per week	3,744
Three ice pullers, at $30 per week	4,680
Fuel:	
Average 2.6 eng. b.-hp. per ton, including storage, 5½ gal. fuel per ton ice, at 5 cents per gallon	8,800
Engine lubricating oil, 1 gal. per 1,000 hp.-hr., equals 0.07 gal. per ton ice, at 50 cents per gallon	1,120
Compressor oil, waste, ammonia, etc., at 7 cents per ton	2,240
Water for ice making and cooling tower make-up, 500 gal. per ton, at 10 cents per 1,000 gal.	1,600
Maintenance on machinery, at 4 per cent on $147,000	5,880
	$35,564
Fixed charges:	
Interest, at 6 per cent on $292,500	$17,550
Depreciation on buildings, 3½ per cent on $145,500	5,100
Depreciation on machinery, 8 per cent on $147,000	11,760
Insurance, taxes and miscellaneous, 1½ per cent on $292,500	4,388
	38,798
Total operating cost	$74,362
$74,362 / 32,000 (tons) = $2.32 per ton	
(Equivalent to electric power at 1.83 cents per kw.-hr.)	

OIL-ENGINE-DRIVEN PLANT Semi-Diesel Type (Fairbanks-Morse, Worthington or Equal) Two Compressor Units, One Generator Unit	
Ice-making machinery and water system, f.o.b. factory	$78,000
Freight, erection, ammonia, salt, wiring, etc.	14,000
Two oil-engine units for driving ammonia compressors by belts, erected, including oil piping, tanks, etc.	19,000
100-kva. generator, direct-connected to 150-hp. oil engine	12,500
	$123,500
Buildings, insulation, etc.—engine room, ice storage and office, at 11½ cents per cu.ft.	$37,000
Insulation of ice tank, daily ice storage, etc.	10,500
10,000-ton season ice storage, including insulation, elevator, doors, etc., at $9.80 per ton, complete	98,000
	145,500
Total investment, exclusive of land	$269,000
OPERATING COST PER YEAR	
Labor:	
One chief engineer, at $275 per month	$3,300
Two watch engineers, at $175 per month	4,200
Two extra men, at $36 per week	3,744
Three ice pullers, at $30 per week	4,680
Fuel:	
Average 2.6 eng. b. hp. per ton, including storage, 7 gal. fuel oil per ton ice, at 7 cents per gallon	11,160
Engine lubricating oil, 1 quart per 100 hp.-hr. equals 0.175 gal. per ton ice, at 50 cents per gallon	2,800
Compressor oil, waste, ammonia, etc., at 7 cents per ton	2,240
Water for ice-making and cooling tower make-up, 500 gal. per ton, at 10 cents per 1,000 gal.	1,600
Maintenance on machinery, 5 per cent on $123,500	6,175
	$39,899
Fixed charges:	
Interest, 6 per cent on $269,000	$16,140
Depreciation on buildings, 3½ per cent on $145,500	5,100
Depreciation on machinery, 9 per cent on $123,500	11,115
Insurance, taxes and miscellaneous, 1½ per cent on $269,000	4,040
	36,395
Total operating cost	$76,294
$76,294 / 32,000 (tons) = $2.38 per ton	
(Equivalent to electric power at 1.96 cents per kw.-hr.)	

WHILE electric drive for ice plants is recognized as the most economical because of the smaller investment, lower maintenance and repair costs and the advantage of employing less skilled labor than is required for other kinds of power, great economy has been claimed for both uniflow and oil-engine-driven plants. Actual comparisons show that electric drive is cheaper than either of these two forms of power. A careful analysis of the cost of operating ice plants with various types of prime movers has been made by J. R. McCoy, assistant commercial manager of the Texas Power & Light Company. In the above comparative tabulation it will be seen that the cost per ton of ice made in electrically driven plant is from 6 to 9 per cent less than in any of the three other plants under consideration.

Automatic Demonstration of Electric Range

TO STIMULATE interest in electric ranges, the Dayton Power & Light Company recently held a demonstration wherein a range was sealed and left to start operation automatically and cook a 5-lb. roast-pork dinner without any attention. This was the opening demonstration in the company's campaign to sell ranges on the easy-payment plan.

Realizing that in every community there are home economists whose acceptance of any household appliance or idea makes it desirable for every home, the Dayton Power & Light Company invited Miss Katherine Hardy, supervisor of home economics in the Dayton public schools; Miss Bessie T. Worman of the Dayton Women's Club, and Miss Verrall J. Craven, supervisor of home economics at the Moraine Park schools, to witness a dinner cooked automatically on the electric range.

HOME ECONOMICS SUPERVISORS WITNESS STARTING OF AUTOMATIC DEMONSTRATION OF ELECTRIC RANGE

These ladies arrived at 6 p.m. and saw the city sealer weigh the meat and put it into the large oven, three vegetables being put in the small oven. The oven doors were then shut and sealed so that they could not be disturbed. The alarm clock was set to start the cooking at 5:30 the next morning and the thermostat was set at the desired points. Then the range was left until the next morning, when the seals were broken and the roast was again weighed. During the cooking it had lost only 16½ ounces, or 21 per cent. This small percentage of shrinkage was due to the airtight construction of the oven retaining the stored-up heat. The graphic wattmeter indicated that both ovens had started to cook at exactly 5:30 a.m. The current in the small oven containing vegetables and apples was cut off twenty-five minutes later, while in the larger oven energy was stopped at 6:25 a.m. The energy consumed at the cooking rate cost only 9 cents.

The Dayton company is working in conjunction with the local dealers in developing a greater range load and is selling ranges direct to customers because it is felt that the company is better equipped to merchandise this type of equipment as the time payments can go along with the regular monthly lighting bills. This selling program extends over all the company's territory adjoining Dayton — Piqua, Xenia and Wilmington—where special demonstrations were also conducted.

U. S. Post Office to Use Electric Trucks

CONTINUED consideration over a period of years has resulted in the purchase of sixteen electric trucks by the United States post office authorities. These vehicles include four trucks manufactured by each of four companies—the Commercial Truck Company, the Autocar Sales & Service Company, the Ward Motor Vehicle Company and the Walker Vehicle Company. The trucks will be used in New York, Boston, Chicago, Philadelphia, Detroit, St. Louis, Washington and other cities. A careful record of operating costs as compared with gasoline operation will be kept, and the result will undoubtedly influence future purchases of electric trucks for post office use.

It is interesting to note that a few years ago W. G. Richards estimated that there would be an annual saving of $200,000 in New York City alone, and more than a million dollars the country over, if gasoline trucks were replaced by electrics for post office service.

What Other Companies Are Doing

Boston, Mass.—To May 1 the sales department of the Edison Electric Illuminating Company had contracted for 33,094 kw. of additional connected load. A quota of 100,000 kw. for the year has been set. New business gained has been highly diversified, and unusually active appliance sales are helping to increase the company's output throughout its territory of nearly 700 square miles.

Dayton, Ohio. — The Dayton Power & Light Company is about to launch a special selling campaign for electrical appliances in co-operation with the dealers who are the members of the Electrical League of Dayton. The plan provides that all persons wishing to purchase appliances can buy them from these dealers and pay for them at the utility office in monthly payments as they pay their electric light bills.

Vancouver, B. C. — The British Columbia Electric Railway Company recently entertained the Vancouver City Council and the mayors of surrounding cities at a dinner at the Stave Lake plant of the company. The occasion was the visit of Sir Ernest Maes Harvey, a London director of the company. George Kidd, general manager of the company, told the guests that three dams are being built at the company's hydro-electric plant to insure a continuous water supply at a cost of more than $1,000,000. This work will be completed in September and is giving employment to 275 men.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Problem of Direct Transformation of Combustive Energy to Electrical Energy (the Combustion Cell).—GÖSTA ANGEL.—The author gives a historical review of this subject and mentions that, although it has not as yet passed the stage of laboratory experiments, the difficulties are not greater than those of other problems of the same nature which have been solved successfully. The three types of combustion cells which are being studied at the present time are: (1) The carbon cells. It is doubtful whether these will ever be practicable on account of the difficulties in obtaining pure carbon. (2) The gas cells. Thus far these have given the best results. The tendency for polarization has made it necessary to work with high temperatures, whereby the efficiency is limited to about 50 per cent. However, this represents a considerable advance above the average efficiency of a steam generator. (3) Cells with electrodes of metal. Very little is known about these as yet.—*Teknisk Tidskrift (Swedish)*, April 14, 1923.

Largest Low-Head Turbines Installed in Siphon Settings.—With the head low or the flow varying through a wide range, water-power developments are frequently uneconomical because of the high cost involved. Where both of these occur in the same installation, as in the case of Green Island (N. Y.) development of Henry Ford & Son, Inc., near Troy, N. Y., the possibilities of making the project a commercial success are greatly lessened. In the Green Island development the head varies from practically zero to 17 ft. and the flow from 2,000 cu.ft. per second to a maximum of 250,000. —*Power*, May 22, 1923.

Generation, Control, Switching and Protection

Frequency Converter Ties Between Large Power Systems.—J. W. DODGE.—With the advent of the "superpower zone" some means must be used of making power of various frequencies available over large areas. The author describes the various types of frequency changers applicable to these systems, discussing their relative merits and their fields of application. — *General Electric Review*, June, 1923.

Statistical Investigations of Disturbances Caused by Lightning in Electrical Installations. — SIGURD RUMP. — This paper contains statistical data furnished by a large Swiss manufacturer of disturbances caused by lightning on electrical installations. The investigation covers transformers, generators and an explanation of the formation of voltage waves in transmission lines. These waves may obtain a very abrupt front when a discharge to ground occurs which causes violent oscillations in the electrical circuits. A number of actual cases are cited to support the author's theory and a few suggestions for the protection of electrical installations against the effects of lightning are given.—*Teknisk Tidsskrift (Danish). Elektroteknikern*, April 18 and May 2, 1923.

Transmission, Substations and Distribution

The Power Balance and General Plans for the Distribution of Energy in Sweden.—NILS EKWALL.—This paper is a description of the work that has been done by a special committee for investigating the power balance in Sweden. Data are given with reference to the estimated power consumption during the next twenty years by various industries. Plans for superpower systems are outlined.—*Teknisk Tidskrift (Swedish)*, May 26, 1923.

New Type of Insulator for High-Tension Transmission Line. — LUIGI PEROTTO.—The successful operation of a transmission system depends to a large extent upon the degree of insulation attained, and the most important factor is the insulator. Some of the troubles encountered with present-day insulators are uneven distribution of the magnetic field and uneven mechanical stresses between the porcelain, metal and cement. The very large percentage of replacements of insulators after a line has been in operation a few years prove that we are still far from having a real apparatus on which we can safely rely. In this article a new type of insulator is described which the author claims avoids all the above-mentioned troubles. This insulator was tested at 520,000 volts and was then mounted in a 120,000-volt test transmission line, giving very satisfactory results.—*Elettrotecnica*, May 25, 1923.

Characteristics and Performance of Conversion Apparatus for Edison Systems.—T. F. BARTON and C. M. FULK. —The operators of Edison systems will find in this article information which will be of great value concerning the characteristics and performance of converters and motor-generators, particularly with regard to starting, synchronizing, low-voltage connections, direct-current voltage range, voltage characteristics, load limiting, three-wire operation, inclosing features, effect of alternating-current disturbances and re-energizing a system.—*General Electric Review*, June, 1923.

Units, Measurements and Instruments

Instrument Transformers and Continuous Service of Power Distribution. — GINO CAMPOS. — Instrument transformers may easily constitute a weak point of any installation, so that special care should be taken in the designing, mounting and grouping of them. This article deals with the most important troubles arising from such kind of apparatus and suggests the best ways to avoid them in order to assure the continuous service of the line. Instrument transformers for high-voltage circuits are also treated.—*Elettrotecnica*, May 15, 1923.

Electric Testing Laboratory. — J. B. BRETON. — Some of the electric machinery left in France by the American Expeditionary Forces has been acquired and salvaged by the French government and has been used to equip a national research laboratory, described in detail in this paper. The available motors, generators, converters, transformers, switchboards, etc., have been arranged so as to provide the most suitable and flexible testing equipment for all kinds of scientific research and technical routine work. A large number of neon high-voltage lamps have been installed where an optical indication of dangerous live parts has been deemed advisable. While the installed machine capacity amounts to many hundred kva., only 150-kva. is available to the laboratory through the main feeder from the Parisian power station.—*Revue Générale de l'Electricité*, June 2, 1923.

Method for the Accurate Measurement of Short Time Intervals.—H. L. CURTIS and R. C. DUNCAN.—A method is described whereby the time between two events which occur less than a second apart can be determined with a high degree of accuracy. The method consists of ruling on a moving film a uniform time scale simultaneously with the recording of the events to be studied. The time scale is obtained by throwing flashes of light on the film, the interval between flashes being governed by a special shutter fastened directly to and operated by the prongs of a tuning fork. The article includes a complete discussion of the necessary conditions for the best results, the sources of error inherent in the method and the accuracy which may be expected.—*Scientific Paper No. 470 of the Bureau of Standards.*

Illumination

Lighting Effects on the Stage.—L. HARTMANN.—The value of lighting in a theater and the lack of outfits in different theaters necessitate a complete electrical equipment for every play. The author describes lighting interior and exterior scenes of dramatic productions, calling attention to the difficulties encountered, such as the impossibility of obtaining pure color effects and the danger of over-illumination. He uses reflex glass as a medium for softening light on both reflectors and

lenses. In some cases footlights are dispensed with and overhead lighting alone is used. The most desirable stage lighting is simple in construction and not radical in effect.—*Transactions of the Illuminating Engineering Society*, May, 1923.

Electrophysics, Electrochemistry and Batteries

Electrolysis Investigation. — The Bureau of Standards has recently undertaken an extensive electrolysis investigation in the city of Galveston, Tex. The primary object of the work is to obtain additional data concerning the application of the earth-current meter to electrolysis testing. It is expected that the results will demonstrate further the utility and necessity of employing this method and instrument where reliable information as to electrolysis conditions and a quantitative measure of the degree of hazard are required.—*Technical News Bulletin No. 72 of the Bureau of Standards.*

Non-Magnetic Cast Iron.—GUMLICH. —A special kind of cast iron is being manufactured which has all the properties of other kinds but is almost totally non-magnetic. It can be used to great advantage in cases where magnetic leakage would cause additional losses in ordinary cast iron and where brass is being used now. In comparison with ordinary cast iron and brass the following data are of interest:

	Maximum Permeability	Ohms per m./mm.²
Cast iron	330	0.950
Non-magnetic iron ..	1.03	1.400
Brass	1.00	0.075

The metal has also a very low temperature-resistance coefficient and may therefore be used advantageously for cast resistor grids. The material is tougher and less sensitive to sudden stresses. While nothing is being said about the composition of the alloy, the author assumes it to be cast iron with 12 to 16 per cent of manganese.—*Elektrotechnische Zeitschrift*, May 24, 1923.

Traction

Overhead Line Construction Through a Six-Mile Tunnel.—G. MARKT.—The electrification of the Arlberg railroad in Austria required special construction for the overhead-line-supporting structures through the 6-mile Arlberg tunnel. The road is 16⅔ cycle, single-phase, 15,000-volt system with a double track through the tunnel. During the entire electrification period traction by steam was carried on through the poorly ventilated tunnel on regular schedule. This caused many difficulties from the effect of fumes and gases both upon the men and upon the line material. A simple catenary suspension with two copper conductors for each track on a bronze carrier cable was chosen and laid out in zigzag over the rails. A mean distance of 255 m. was maintained between the supports, which were fastened to the top of the tunnel with two heavy bolts. The rather limited overhead room and the relatively high potential required a double insulation for all live parts, which was made by a combination of double-bell pin insulators and porcelain rolls. The very uniform temperature within the tunnel made any automatic tension "take-up" of the wires unnecessary. In the middle of the tunnel oil switches to disconnect the line or to interconnect any of the four wires are installed. All structural steel used in the supports is coated by the Schoop metal-spray process first with a layer of zinc and then with a layer of lead. An interesting statement, made to give an idea of the extremely corrosive action of combined humidity and fumes in the tunnel, is that not less than 30 tons of steel is eaten away from the rails every year by rusting. This is about five times more than on the open road. A special six-car building train was used in the tunnel for line construction, including one car containing an electric lighting set. It is claimed that the profuse illumination of the working area within the tunnel added greatly to the quick erection, which averaged five supports per shift. — *Siemens Zeitschrift*, May, 1923.

Electrification of Swedish Railroads. Power Supply and Different Systems.—J. KÖRNER.—The electrification of the railroad between Stockholm and Gothenburg (about 300 miles) was tentatively decided upon in 1920 when the committee for investigation of this question recommended the single-phase system (15,000 volts, 16⅔ cycles). The Riksdag appropriated money for beginning the work under the condition that additional investigation should be made to establish definitely the disadvantages of the single-phase system. This paper is a review of the work of the committee chosen for this purpose. The question of power supply is outlined and a comparative economical analysis is made between the three systems under consideration (15,000-volt, 16⅔ cycle, single-phase; 1,500-volt direct current and 3,000-volt direct current. The results of this analysis indicate that even with the additional expense encountered in changing the telephone and telegraph lines the advantages of the single-phase system are sufficient to warrant the committee in adhering to the original recommendations.—*Teknisk Tidskrift (Swedish), Elektroteknik*, April 7, 1923.

Telegraphy, Telephony, Radio and Signals

Disturbances in Telephone and Telegraph Lines in Connection with Electrified Railroads.—ARVID HOLMGREN.—The author gives a general review of the subject and discusses the available methods for elimination of these disturbances. It is shown that an application of the single-phase system to the railroad from Stockholm to Gothenburg must be accompanied by a rearrangement of the present system of telephone and telegraph lines. The minimum distance between a single-phase railroad and a telephone or telegraph line is considered as 650 ft. This entails an additional expense for the single-phase electrification of this railroad of about 8,000,000 kroner, in spite of which the single-phase system in this case maintains its superiority.—*Teknisk Tidskrift (Swedish), Elektroteknik*, April 7, 1923.

Wireless Apparatus.—W. H. ECCLES. —The author discusses several new methods of radio transmission and describes apparatus that has been tested out in laboratories but not yet tried on a large scale.—*Electrician (London)*, May 11, 1923.

Carrier-Current Communication Over High-Voltage Transmission Lines.—E. AUSTIN.—The author's comprehensive and practical treatment of this subject, concerning which there has been little published hitherto, is of particular value at this time. He discusses advantages and disadvantages, the more suitable types of carrier equipment, describes a few installations and prophesies as to the future.—*General Electric Review*, June, 1923.

Directive Radio Transmission on a Wave Length of 10 Meters.—F. W. DUNMORE and F. H. ENGEL. — The authors describe a series of experiments in radio-telegraph and radio-telephone transmission on a wave length of 10 m., using at the transmitting station a reflector consisting of short vertical wires arranged as elements of a parabolic cylinder. It was found that at least 75 per cent of the radiated power was confined to an angle of 40 deg. Studies were made of the effect of removing the wires near the center of the reflector, of removing alternate wires in all parts of the reflector, or detuning the wires, and of varying the aperture of the reflector. Constructional details of the apparatus employed are given.—*Scientific Paper No. 469 of the Bureau of Standards.*

Miscellaneous

Acid-Proof Coatings for Concrete Surfaces.—A bulletin dealing with acid-proof coatings for concrete surfaces, which has been recently revised. It contains many corrections and much new material, among which are specifications covering materials for acid-proof mastics and methods for their application as well as a detailed description of acid-proof asphalt flooring composition for cold application.—*Letter-Circular No. 42 of the Bureau of Standards.*

Development of Industrial Safety Codes. — M. G. LLOYD. — After giving statistics showing the need for accident-prevention work from both the humanitarian and the economic viewpoint, this paper shows the value of state inspections and national codes. It then presents a brief history of the American Engineering Standards Committee's activity in this field and of the Safety Code correlating committee. An outline of the manner in which safety codes are now formulated is given.—*Mechanical Engineering*, June, 1923.

New Books

Reviews of the Latest Contributions to
Technical, Industrial and Commercial Literature of Particular Interest
to Members of the Electrical Industry

Hydro-Electricity in Northeast Italy

Report of the Regional Commissary for the Generation and Distribution of Electricity in the Venetian Provinces.

This report by Prof. Lorenzo Ferraris, the commissary appointed by the state with full powers to regulate the operation of hydro-electric and steam plants and the curtailment of the use of electricity to all towns and rural consumers during the period of the exceptional drought in the Venetian Provinces between December, 1921, and March, 1922, describes the plan adopted and reproduces the rules and orders issued by the authorities, stating the results obtained. Independently of this specific information, the document is a most valuable analytical study of an extensive regional hydro-electric development covering the large territory of the northeastern Italian provinces, including the cities of Venice, Padua, Verona, Udine, Trento and Trieste.

The subject is treated in a comprehensive and thorough manner. Its every phase is analyzed with the acumen of a broad-visioned engineer who not only tries to co-ordinate the available resources to ameliorate the emergency conditions of the moment but also points out the possible improvements which would prevent a repetition of similar shortcomings. In this respect the report is full of suggestions which make it valuable to every one interested in hydro-electric power developments with a seasonable or variable flow of water.

The report is richly illustrated with photographs, maps and diagrams. The printing and reproduction are of a high standard and clearness.

PHILIP TORCHIO.

Depreciation of Public Utility Properties

By Henry E. Riggs. New York: McGraw-Hill Book Company, Inc. 211 pages.

Of all words subject to misunderstanding in public utility work "valuation" and "depreciation" head the list. Views held by honest engineers and accountants are almost as divergent as the colors of the rainbow. Nor is the highest court of the land, with all the vaunted skill of the legal mind to bring order out of chaos and clarity out of abstruseness, much better than they. Valuation and depreciation partake of the nature of chameleons and change color with circumstances, with the times and with the courts. Eventually we shall know what valuation and depreciation, legally defined and fixed, mean, but not now.

So the author attempts to find that middle ground of absolute fairness and justness which must be determined before the public utility issue may be considered as reasonably settled. He leads the reader through six chapters of germane and relevant matter dealing with regulation, investments, rates, operations, price fluctuations and fair value and then takes up replacement and depreciation and shows their relation to fair value and changes in the matter of price. He buttresses his arguments with numerous Supreme Court decisions bearing on the subject and adds an appendix of fifty-nine pages. The author has a good grasp of the subject and treats it with a broadness that is refreshing. The work is well done and ought to make a welcome addition to the library of any public utility executive and engineer engaged or interested in valuation work.

Wasserkraft Ausnützung und Wasserkraft Maschinen

No. 732 of the collection "Aus Natur und Geisteswelt." By F. Lawaczek. Leipzig and Berlin: B. G. Teubner. 116 pages, 57 illustrations.

All the booklets of this large collection treat their subjects in a popular manner easily comprehensible to the layman. The one under notice contains three main chapters: "Economical Basis of the Use of Water Powers," "Technical Basis of the Use of Water Powers" and "Hydraulic Machines." The first part is a beautifully written "hydraulic romance," if one may be permitted to use the term. The dwindling supply of coal, which at the present rate of consumption may be exhausted within eight generations, and, on the other hand, the never-failing watersheds will force mankind in its pursuit of energy-producing sources to turn more and more and eventually altogether to hydraulic power. The second part of the little book deals with the methods of measuring water energy and the use and principle of dams and reservoirs. The last section describes in a simple way waterwheels, turbines and hydraulic air compressors.

A. PALME.

Lighting Circuits and Switches

By Terrell Croft. New York: McGraw-Hill Book Company. 472 pages, 557 illustrations.

A practical reference book relating to electric lighting circuits and switches for interior building applications operating on low-potential systems (less than 600 volts). Most of the matter deals with 110-220-volt, two-wire and three-wire systems. The principal rules of the National Electrical Code which concern the subjects under discussion are interpreted. How to comply with these code rules is explained.

The simpler circuits are explained and described in the book, but its most important function is to show diagrams and give descriptions of the more complicated circuits and control methods. These are the methods with which relatively few men are familiar and which are in any case easily forgotten. The work consists largely of diagrams and drawings which it has been endeavored to make self-evident.

There is a closing division which discusses theater-lighting circuits. This includes complete specifications for the electric lighting of a modern theater.

Appareils et Installations Télégraphiques

By Prof. E. Montoriol, Ecole Supérieure des Postes et Télégraphes, with preface by A. Blondel. Paris: J. B. Baillière et Fils. 625 pages, 449 illustrations.

This work is a detailed exposition of the present state of telegraphy both in France and in other countries. The author begins by describing transmission apparatus, including printing devices, autographic apparatus, telephotographic devices and telautographic methods. Then he examines the different means of increasing line capacity, those relating to the conductors themselves such as the sectionalization of the lines, relays and transpositions; those which permit simultaneous transmissions such as duplex, quadruplex and multiplex systems, oscillating currents and the use at the same time of the same line for telegraphic and telephonic messages, and, finally, automatic and multiple transmission systems. The book concludes with a comparison of all the systems under review. This recapitulative study, based upon indisputable technical considerations, is complete and precise. The volume will be found indispensable to professional engineers.

Books Received

Atoms. By Jean Perrin. New York: D. Van Nostrand Company. 231 pages.

Elektrische Schaltvorgange. By Reinhold Rudenberg. Berlin: Julius Springer. 504 pages, illustrated.

Radio—Télégraphie, Téléphonie, Concert. By E. Reynaud-Bonin. Paris: Gauthier-Villars et Cie. 176 pages, illustrated.

Applied Personal Procedure. By Frank E. Weakly. New York: McGraw-Hill Book Company. 192 pages, illustrated.

Railroad Electrification and the Electric Locomotive. By Arthur J. Manson. New York: Simmons-Boardman Publishing Company. 332 pages, illustrated.

Atlas of U. S. A. Electric Power Industry. Outlining Suggested Regional Electric Power Districts and Proposed Constant-Potential Transmission Systems for the United States of North America. By Frank G. Baum. New York: McGraw-Hill Book Company, Inc.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Regulation of Coal Mining

President's Commission Recognizes Its Necessity—Upholds Power of Government to Control

IN A PRELIMINARY report on the anthracite coal situation, made public on Monday last, President Harding's fact-finding commission unanimously declares for government regulation with power in the last resort to seize the mines. It says: "Coal is quite as much a public necessity as gas, street-railway service or any other service or commodity that has been brought under public regulation." The commission admits that there is not sufficient basis in knowledge or experience as to just how far control or regulation should be exercised in insuring maximum service to the public by the coal industry, but the industry itself is asked to modernize its wage agreements and the machinery for interpreting them, to set up an adequate inspection service of its own and to improve its practices generally, and the public is called upon to exert itself for its own welfare.

The commission recognizes that any failure on the part of the industry to discharge properly its own responsibilities, thereby stopping the flow of coal long enough to imperil the public interest, would justify the government in taking over "the operation of the mines and the transportation and distribution and marketing of the produet, with full power to determine the wages to be paid the mine workers, the prices at which the coal shall be sold and, subject to court review, the compensation to be paid to land and mine owners." Not more than a month ago the Supreme Court of the United States, in the Kansas Industrial Court case, said that since the adoption of the Constitution the vocations of the coal miner and the coal operator have not been regarded as public callings. The utterance of the court is a historical fact, but this jury of six representative Americans has decreed something different for the future. That jury holds "that a limited natural monopoly, like anthracite, held by a relatively small number of individuals, estates and companies, and supplying a necessity of life for millions of our people, cannot continue to be treated as if it were not affected by a public interest."

Exhorting operators and miners alike to "forget past differences and grievances and attack the problem in the spirit of justice and fair dealing, not only between themselves, but with due regard for the rights and sensibilities of the American people," the commission concludes:

"The commission recommends at this time no punitive legislation. It awaits with interest whether the next agreement entered into shall show a co-operative spirit, a clear idea of partnership on the part of all concerned in it, and a proper conception of the rights of the American people. These rights in the anthracite region are no different from those in the bituminous, and the judgment of the commission will be very largely affected by what takes place in the present negotiations."

Law Handicaps Louisville

City's Debt Limit and Other Barriers Give Company Advantage in Falls of Ohio Contest

IT IS so apparent that the city of Louisville is not legally competent to undertake the development of power at the Falls of the Ohio and on the Green River that it is difficult to see how it would be possible for the Federal Power Commission to grant the application of that municipality for rights in connection with this development. The city, however, is very much in earnest, and it is safe to assume that careful consideration will be given to all phases of the matter before any decision is handed down.

The Louisville Hydro-Electric Company, with the application of which Louisville's conflicts, is a subsidiary of the Louisville Gas & Electric Company, which has an existing steam installation of 90,000 hp., 30,000 hp. having been installed recently. The power market in Louisville and its vicinity is growing, but a report for 1920 shows the average load to be only 25,000 kw. with a peak demand of 61,000 kw. It is estimated that 75,000 hp. of secondary power can be developed at the Falls of the Ohio. The Louisville Hydro-Electric Company desires to use its existing steam power partly as a standby to this water power. The city of Louisville, which asserts it will not interfere in any way with the existing market of the Louisville Gas & Electric Company, proposes to supplement the Ohio River power by constructing a high dam in the Green River, near Mammoth Cave. Sufficient storage is planned to maintain 100,000 hp. output throughout the year from the combined plants. The estimate of its engineer, Gen. William L. Sibert, indicates that the Green River auxiliary will cost $5,000,000 and the Falls of the Ohio plant $10,000,000, or $150 per horsepower development.

Legal Barriers in City's Way

Under the water-power act the Federal Power Commission must determine the legal competency of any applicant. In this case it must consider the likelihood of the city's finding itself unable to finance its plans and must also satisfy itself that the city has the authority to transmit and sell power beyond the city limits and in another state. It is apparent that if an entirely new load cannot be brought in, there is not sufficient room for the two power-producing enterprises. In that case it would be necessary for the city to take over the plants and distribution system of the power company or compensate it for severance damages, which would be virtually equivalent to the purchase of the plant; but the city cannot take over the works of the power company without exceeding the limit of its bonded indebtedness.

Inland Electric Navigation

Ships Embodying Novel Features Will Go Into Service on Canal Route from Duluth to New York

CONSTRUCTION details of the electrically propelled ships planned by the McDougall Terminal Warehouse Company for operation between Duluth and New York have just been made public. These vessels will be built by the Great Lakes Engineering Works of Detroit.

The ships are designed for operation through the Great Lakes and Welland Canal and the New York State Barge Canal via Oswego and the Hudson River to New York and coast points. They will be of full Welland Canal dimensions—258 ft. long, 42 ft. beam and 19 ft. in depth—and built to the highest class of the American Bureau of Shipping for Great Lakes and coastwise trade. The class covers trade to the West Indies, Gulf of Mexico and Caribbean. On Barge Canal draft the ships will have a dead-weight capacity of about 1,700 tons and at sea about 2,600 tons.

The propelling machinery is to be of the Diesel-electric type, in which two six-cylinder Lombard-Diesel engines in each ship are coupled to and drive electric generators. These in turn will supply electric current to the motors, which will be directly coupled to the twin screws. The generators will also supply energy for all the auxiliary machinery equipment, such as pumps,

windlasses, capstans, steering gear, refrigerating machinery, fans, lighting, etc. The quarters will be heated electrically; the galley range will be of the electric type; the water for baths and other purposes will be electrically heated, and electric fans in every room will keep the quarters cool in hot weather. Even the whistle will be operated by a motor instead of by steam or compressed air. Auxiliary generating units will also be provided for use in port or when the vessel is not under way.

PROPELLER CONTROL

An unusual and interesting feature is found in the system of control of the propulsive units. The propeller motors will be controlled entirely from the pilothouse, both as to speed and direction, through especially designed controllers under the hand of the watch officer. No reversing or maneuvering of the main engines will be done at all. The engines driving the generators will run steadily at one speed and the engine room force will take no part in the handling of the ship. This arrangement, which gives extreme flexibility as well as centralization of control, is peculiar to the electric drive. A further advantage lies in the elimination of racing of propellers in heavy weather, with attendant risk of failure of propellers and shafts.

The plans and specifications for these vessels were prepared by Henry Penton, Cleveland, in collaboration with A. Miller McDougall, president of the Terminal company.

Reliability of Relays a Theme at Seattle

Forecasting Water Supply, Temperature-Cycle Tests and Demand Meters Are Other Topics—Commercial Section Discusses Range Load—Insurance Man Sees Public Ownership Menace

ALTHOUGH only one day was devoted to the technical and commercial sessions of the Northwest Electric Light and Power Association, which, as already reported in these columns, met in Seattle on June 27-30, a great deal was accomplished in this time and the meetings and papers were of more than ordinary interest and profit. To operating men attending the technical session the report and discussion on relays were perhaps the most instructive. It was made clear that nearly all power companies have either fully equipped their systems with relays or have comprehensive relay programs. S. C. Lindsay of the Puget Sound Power & Light Company said that out of eighty-four cases of trouble on that company's system in the past year there were only six cases where relays did not function properly. A manufacturers' engineer, joining the discussion, said that relays can be depended upon to operate 95 per cent effectively in a large number of cases of trouble.

FORECASTING WATER SUPPLY

The hydraulic power committee during the past year made a study of methods for measuring snow to forecast water supply. Information obtained from such studies was declared to be highly valuable to the power companies, and it was planned to carry on this work and attempt to develop a reliable system of forecasting. It was suggested that during the coming year this committee make efficiency tests on hydro-electric plants and study their operating and maintenance problems. It was pointed out also that there is need for greater efficiency in draft tubes.

Discussion of the overhead-systems committee's report indicated that power companies in the Northwest prefer kiln-fired cedar poles where these can be obtained.

M. T. Crawford of the Puget Sound Power & Light Company described the temperature-cycle tests on high-tension insulators which are being conducted in Seattle and asserted that the tests had not progressed far enough to draw definite conclusions, but that good results are expected.

Following the report of the meter committee, R. E. Thatcher of the Puget Sound Power & Light Company presented a paper on the proper selection of demand meters. This paper included curves to show the economical load to put on a meter. These made clear the large loss in revenue resulting from operating meters on heavy overloads.

A. H. Kreul of the Portland Railway, Light & Power Company stated that because of this loss of revenue and the burn-outs resulting from the large present-day appliance load on 5-amp. meters his company has adopted the 10-amp. three-wire meter as standard for its system.

RANGES ARE COMMERCIAL SECTION TOPIC

The Commercial Section has asked the executive committee of the association for an appropriation to employ a competent man to make a thorough investigation of the electric range load. The proceedings at the commercial session made it manifest that though all of the large companies in the Northwest have accepted the electric range as a desirable load builder, little is known about the characteristics of such loads. It is therefore proposed to investigate every phase of the range business—the demand of individual ranges and groups of ranges, the cost of serving and servicing ranges and the desirability of the electric range as a revenue producer. All of the larger power companies in the Northwest are in the business of selling ranges and are actively pushing sales because they have found that the electrical dealers are not able to give them the volume of range load they desire.

In a discussion on the compensation of appliance salesmen the consensus of opinion was that the group bonus system is preferable to the individual bonus plan.

OUTSIDERS SEE COMMON PROBLEM

The discussion on the first day of the convention of utility company problems by speakers invited from outside the industry was animated and showed on the part of some of these representatives of other interests a degree of distrust of public sentiment larger than the electric light and power company which cultivates good public relations is prone to entertain. H. S. Ives, an insurance man of Chicago, for instance, in speaking on "State and Municipal Ownership from the Insurance Man's Point of View," dwelt upon what he held to be the necessity for a realization on the part of utilities and every privately owned enterprise and industry that they have a common problem in combating the public ownership sentiment which he thought to be sweeping the nation and threatening to engulf the entire country in a reign of socialism.

After two days of hard work in Seattle, the delegates and those accom-

DELEGATES TO SEATTLE CONVENTION OF NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

panying them to the number of more than 250 went by boat to Victoria, B. C., for two days of recreation. The annual golf tournament and banquet were held there and several sightseeing trips were made to points of interest.

NEW OFFICERS ELECTED

At the executive meeting following the banquet the following officers were elected: President, George L. Myers, Pacific Power & Light Company, Portland; vice-president for Washington, R. M. Boykin, North Coast Power Company; vice-president for Oregon, A. C. McMicken, Portland Railway, Light & Power Company; vice-president for Idaho, R. B. King, Idaho Power Company, Boise; vice-president for Utah, S. R. Inch, Utah Power & Light Company, Salt Lake City. L. B. Faulkner of Olympia, Lewis A. Lewis of Spokane and Lewis A. McArthur of Portland were elected members at large of the executive committee.

Sacramento Has Big Plan

River Sites in California, Tennessee, Virginia and Arizona Attract Promoters' Attention

SACRAMENTO has applied to the Federal Power Commission for a preliminary permit covering a large power irrigation and water-supply project which will involve the ultimate development of 260,000 hp. in Silver Creek in Eldorado County, Cal. The city desires to develop two reservoirs on the headwaters of the Rubicon River. The water then is to be diverted into a large reservoir on Silver Creek. Below this storage reservoir the plans call for three large power houses on Silver Creek. One is to be at the junction with Brush Creek and the South Fork of the American River and another at Caloma on the South Fork. The water from the tailrace of the Brush Creek power house will be carried through a siphon under the South Fork without any additional diversion, so as to avoid pollution. From the Caloma power house the water will be carried through an aqueduct to an equalization reservoir and thence to the city for water supply and irrigation.

The Sacramento project will conflict to a certain extent with the rights of the Western States Gas & Electric Company. That company makes use of water from the South Fork, including the natural flow of Silver Creek, at its plant below the mouth of Brush Creek. An adjustment will have to be arranged before the Sacramento plans can be carried into effect.

TENNESSEE DEVELOPMENTS

That serious consideration is being given to the power possibilities of eastern Tennessee is evidenced by the continued activity in that region. The Knoxville Power & Light Company, which some months ago filed an application with the commission for a preliminary permit covering four large developments on the Clinch River, is understood to have in contemplation the addition of two sites to that application. These sites are on the Tennessee itself below the mouth of the Clinch.

In addition certain Philadelphia interests have indicated their intention to file an application in the near future covering a development on another of the tributaries of the Tennessee in that region. The city of Andrews, N. C., recently has bonded itself for $350,000 to finance a proposed development on the Hiawassee.

POWER FROM THE ROANOKE

Norfolk interests are understood to have in mind a development on the Roanoke River between Roanoke and Clarksville. Use is to be made of a number of storage reservoirs on the principal three tributaries of the stream, it is said. In that region some of the bottom land is used for pasturage and can be purchased at comparatively low cost. A portion of the farming land adjacent to the stream, however, is so valuable that its use for reservoir purposes would not be justified, but this can be avoided by a series of low-head dams. There is an insistent demand for power in the region.

AN ARIZONA PROJECT

The demand for power in the copper-producing section of Arizona has led John L. Fish to apply to the commission for a preliminary permit covering a project on Salt River. He proposes to carry the water across a tract of land formed by a bend in the river. The details of his project have not been filed as yet.

Industrial Heating Courses Successfully Completed

A very thorough course of instruction marked the third year of the central-station school of industrial heating carried on under the auspices of the N. E. L. A., and the response met with among central-station companies has been so encouraging that it is planned to continue the school in future years and to organize similar schools in the different geographic divisions of the association.

The courses this year were given by the Westinghouse Electric & Manufacturing Company at East Pittsburgh and the General Electric Company at Schenectady and included lectures on practically every phase of industrial heating and inspection trips to plants where heating installations had been made. The program was arranged by Wirt S. Scott of the Westinghouse company, who is chairman of the Industrial Heating Division of the N. E. L. A. and who, in 1921, was the real originator of the whole idea of an industrial heating school. Mr. Scott also took personal charge of the class at East Pittsburgh and himself gave many of the lectures. Harold Fulwider of the General Electric Company was in charge of the class at Schenectady.

Federal Commission's Year

Fifty-one Applications for Permits and Fifty-three for Licenses Are Received in 1922-23

THE Federal Power Commission wound up its fiscal year on June 30 with a grand total of 425 applications. Of these 104 were received during the fiscal year of 1922-23, as compared with ninety-two during the fiscal year ended June 30, 1922. Fifty-one of the applications received during the fiscal year ended June 30, 1923, covered preliminary permits sought for purposes of investigation. The remaining fifty-three applications were for licenses covering construction. Of those seventeen covered major projects, thirteen covered projects of less than 100 hp. and twenty-three covered transmission lines. During the three years of its existence the commission has authorized a total of ninety-seven preliminary permits and 103 licenses. Of the licenses forty-two are for major projects, nineteen are for minor projects and forty-two are for transmission lines. More than one-half of the preliminary permits and licenses which have been granted during the life of the commission were issued during the past fiscal year.

The works involved in the forty-two licenses covering major projects are either constructed or under construction except in eight instances. It is believed that all but three or four of the forty-two projects will go ahead within the time allowed by the terms of the license.

MANY PRELIMINARY PERMITS UNUSED

With respect to the preliminary permits, however, the progress has not been so marked. Only five of the ninety-seven issued have been followed up thus far with applications for licenses. Twelve of them have been canceled. Most of the preliminary permits first issued have been amended to extend the time to the full three-year limit allowed by the law. The three-year limit will expire for several important projects next March. Among those is the White River project of the Dixie Power Company in Arkansas. Another is the large project of the Washington Irrigation & Development Company at Priest Rapids on the Colorado River, where a development of 350,000 hp. was contemplated. Another is the proposed Niagara Gorge development of the Lower Niagara River Power & Water Supply Company, a subsidiary of the Niagara, Lockport & Ontario Power Company. That development is being held up at present by the failure of the State of New York to grant the company the necessary permit.

Federal Power Commission officials think that of the eighty preliminary permits now outstanding about one-half show good prospects of going through. The other half, it is believed, will be canceled or will expire by limitation through failure on the part of the permittee to go ahead with the proposed development.

New Division N.E.L.A. Meets with Ohio Men

Cedar Rapids Convention Listens to Speakers from Kentucky and West Virginia—Public Relations the Main Theme of Opening Session—Metermen Co-operate

LAUDING the customer-ownership plan as being responsible for the sale of $8,000,000 of public utility securities direct to the people of Ohio during 1922, President E. L. Franklin opened the twenty-ninth annual convention of the Ohio Electric Light Association at Cedar Point on Tuesday afternoon of this week. He felt that this plan had been an important factor in the recent change in public sentiment toward utilities. Were politicians to realize that their schemes of municipal ownership would strike directly at the very people who owned these utilities, they would be forced to seek other means of political aggrandizement.

Regarding the trend toward superpower systems, President Franklin urged all operators who were planning long transmission lines to conform with the projects for nation-wide distribution of energy. He also reviewed the executive work of the association in this year, particularly that concerned with legislation. The most important result was the killing of a bill designed to abolish state regulation.

Secretary D. L. Gaskill, in his report, made for the executive committee, told of the expansion of the O. E. L. A. meter committee to allow joint action with the meter committee of the East Central Geographic Division of the N. E. L. A. This action, he felt, should greatly assist and further the activities of this new geographic division.

EAST CENTRAL DIVISION, N. E. L. A.

The Wednesday morning session was given over entirely to this year-old N. E. L. A. division, L. B. Herrington of Louisville, Ky., president of the executive committee, being in the chair. Donald McDonald, Louisville Gas & Electric Company, speaking on united utility effort, thought that one reason for the persecution of utilities in the past was the lack of the "herd instinct" of mutual protection among central-station men. They were too often very excellent electrical men but not good enough as public utility men to protect themselves against the onslaught of greedy politicians. The increasing number of stockholders among the public, Mr. McDonald considered, was one of the best means of protection of utility rights.

The promotion of sound public relations was discussed by Victor H. Morgan of Cleveland, formerly editor-in-chief of the Scripps-Howard newspapers of Ohio. He insisted that the responsibility of "helpfulness" was the greatest imposed on present-day utilities, if they desire to keep pace with advancing civilization. This was, he said, because the utilities are doing a service collectively which no man could do individually. Mr. Morgan also listed three factors upon which good public relations depend, namely, the prestige of the company locally, the mental attitude of the management and the value of direct advertising. Unless a corporation was endowed with the same characteristics as a well-bred, well-liked man, it could never expect to obtain this personality and have the charm of a living entity instead of a cold corporation.

MINE ELECTRIFICATION IN WEST VIRGINIA

A. Bliss McCrum, secretary Public Utilities Association, Charleston, W. Va., dealt with utility developments within his state, where utilities now sell 40 per cent of their generated power to coal mines and where 85 per cent of these mines are electrified.

On Thursday and Friday the sessions were devoted mainly to committee reports and to discussions of the generation of steam by powdered fuel and of mechanical stokers. Registration to Wednesday night totaled more than five hundred.

California Commission Tells of Overhead Inspection

The Railroad Commission of California has issued a statement concerning its progress in the task delegated to it by the Legislature of undertaking a detailed inspection of all overhead electric utility facilities, with the view to eliminating improper and hazardous construction, as a matter of protection to the public and the utility workers and for the maintenance of safe and efficient service.

The work has been under way for approximately one year, in which time the state has virtually been covered from Sacramento south. This area includes the facilities of more than fifty electric utilities, more than five hundred cities and a large number of individual services. Upward of 75,000 miles have been covered by the inspectors of the commission in the pursuit of the work. Completion of the preliminary inspection and the final inspection itself will require two years additional, it is estimated. The cost of conducting the work is being charged against the owners of the lines inspected.

The commission has felt that the greatest hazard to workmen and the public existed in the facilities of the power and traction utilities, and with this in mind inspection has been made of these properties before any attempt to inspect the lines of the telegraph, telephone and other signal companies, except in cases where in making inspection of supply lines a particular hazard has been discerned in the signal lines. The procedure in general is as follows: One company in a locality is notified a week or ten days in advance that the inspection is soon to follow, and the inspector fixes a definite date for starting the work. While examining the lines of the first company he so arranges his time and labors that he can go on to the overhead installations of other companies, private individuals and municipal plants in the territory without the expense of doubling on his tracks.

From the data gathered in the field the commission is enabled to make an accurate estimate of the cost and time necessary to make the correction in existing construction, and this information is incorporated in the decision which the commission hands the utility company concerned after the completion of the preliminary inspection. It is contemplated to make a final inspection of the facilities at the expiration of the time allowed in the decision.

Snake River Gorge Development a Future Problem

Owing to the remoteness of the time when it will be necessary to use the gorge of the Snake River between Homestead, Ore., and the mouth of the Grand Ronde River either for power development or for railroad right-of-way, it is probable that the Federal Power Commission will suspend indefinitely any ruling as to the use of the gorge.

The Oregon-Washington Railroad & Navigation Company, a subsidiary of the Union Pacific, has applied to the commission for a right-of-way up this gorge. In its application the railroad states that it is essential to a water-level route from the Snake River to the coast.

The commission already has an application from the Pacific Power & Light Company of Portland, Ore., a subsidiary of the Electric Bond & Share Company, asking a preliminary permit covering the power sites in the gorge.

A preliminary investigation of this stream by W. G. Hoyt, of the United States Geological Survey, shows that approximately 1,250,000 hp. can be developed in this section of the river. He suggests that the railroad be located so as not to interfere with the possible development of the power sites. He states his belief that the power should be developed at two high dams. If that plan should be followed, it would render the gorge useless to the railroad company. The side walls are steep and covered with slides of lava rock which would preclude the location of the right-of-way at any point except along the water line.

Ratings of Commercial and Municipal Plants in Error

A clerical error of considerable extent has been found to exist in the tabulations on central-station ratings which were used as a basis for the diagrams on page 57 of the July 7 issue of the ELECTRICAL WORLD. A check is now being made of these tabulations, and the corrected figures will be published in an early issue.

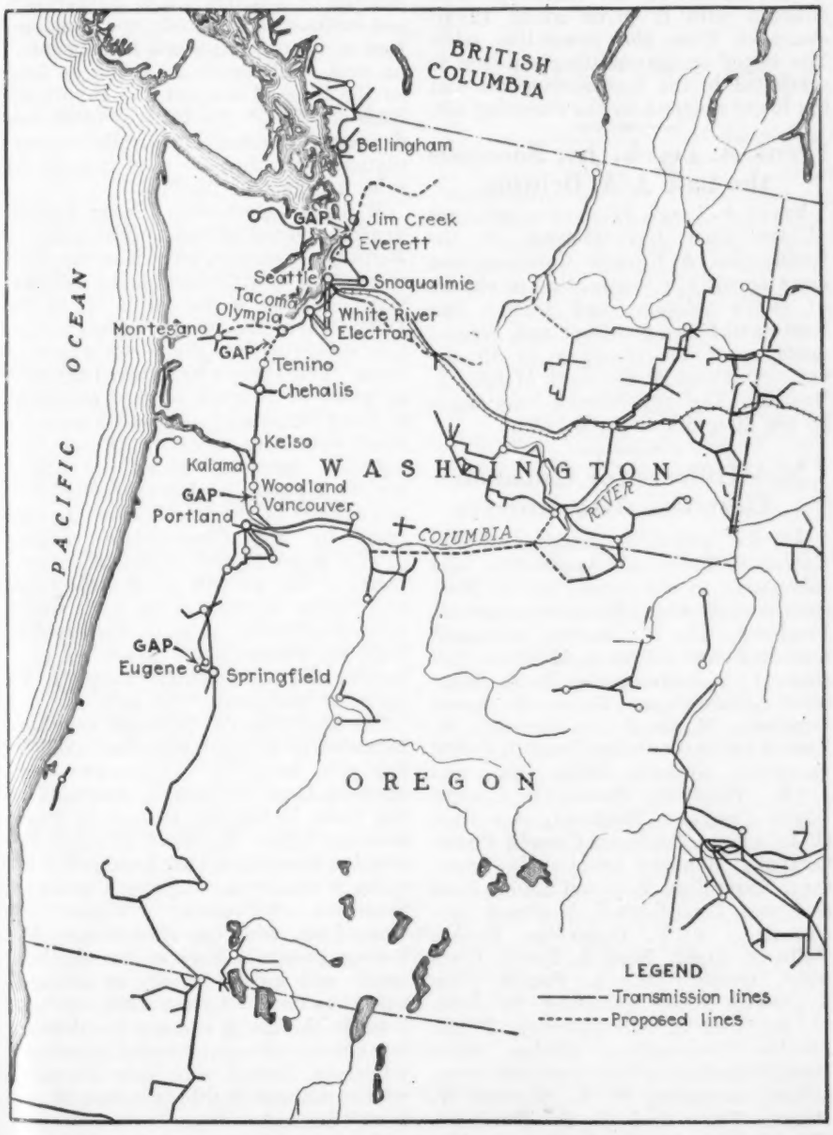
Another Gap to Be Bridged

Puget Sound Power & Light Company Will Build Transmission Line from Olympia to Tenino, Wash.

APPLICATION has been made to the County Commissioners of Thurston County, Wash., by the Puget Sound Power & Light Company for permission to erect a transmission line from Olympia to Tenino, Wash. This line will form a connecting link in the Stone & Webster system in western Washington and will make a continuous transmission system extending from Everett on the north to Kalama, on the Columbia River, on the south. The company has acquired the light and power system at Aberdeen, Wash., and construction work is in progress to connect Olympia and the Aberdeen plant through Montesano over the Olympia Highway. The Olympia-Tenino link will also serve to tie in the Gray's Harbor system with the plant of Kalama. This new tie is of significance because it brings nearer to a realization the interconnected transmission system from the Mexican to the Canadian border. Upon its completion there will remain only three small gaps in the system—a 10-mile gap between Jim Creek and Everett, Wash.; a 25-mile gap between Woodland and Vancouver, Wash., and a 4-mile gap between Eugene and Springfield, Ore.

Denver League Ready for Third Campaign

Preparatory to launching its third campaign in Denver, the Electrical Cooperative League of that city has elected O. L. Mackell, Denver Gas & Electric Light Company, as chairman, D. D. Sturgeon as vice-chairman and Dean D. Clark as treasurer. R. W. Elliott was re-elected secretary. The new chairman has appointed a skeleton committee to undertake the membership drive and fund-raising part of the league's program. The budget of $13,500 is $3,000 more than last year. Much of it has already been pledged.



GAP SOON TO BE FILLED AND THREE SMALL GAPS REMAINING IN INTERCONNECTED TRANSMISSION SYSTEM OF COAST

Regulating the Hudson

Plans Filed for Fifty-Million-Dollar Project Involving Water Power Totaling 200,000 Hp.

PLANS for an engineering scheme involving the ultimate expenditure of $50,000,000 in the construction of fifteen storage reservoirs for regulation of the flow of the Hudson River watershed were filed recently by the Hudson River Regulating Commission in twelve counties of New York State in which the reservoirs will be constructed. In the Hudson River regulating district are the counties of Albany, Columbia, Essex, Greene, Fulton, Hamilton, Rensselaer, Saratoga, Schenectady, Schoharie, Warren and Washington, and it is upon the cities, towns and villages in these counties that the cost of construction will fall.

"The importance of this comprehensive plan to scores of industrial plants owning and using water power on the Hudson and to the several cities and villages along the river, which will be benefited by a constant stream flow and the control of flood waters, can hardly be overestimated," said a statement from the commission. Aside from the promised guarantee of power and the prevention of floods, advantages claimed include an annual saving in coal of approximately 2,000,000 tons and an increase of the minimum flow at Albany from approximately 1,000 second-feet to more than 5,000 second-feet, increasing the depth of water in the channel by about 18 in., thus aiding navigation and improving sanitary conditions. It is also estimated that the development when completed will make possible the harnessing of 200,000 additional horsepower in the capital district, the dams required for the reservoirs being utilized as a part of a hydro-electric development system. Five years is given for completion of the storage project.

Thus the river-regulating plan performs two functions—the regulation of the flow of streams and the development of latent power. It is briefly a system under which the state lends its authority to the private development of water power under conditions meant to protect the state's interests completely. For instance, while the owners of water powers in the Hudson watershed assume the full burden of cost of power development, all the land and works constituting a regulating reservoir become the property of the state without expense to it. The power interests obtain only a fifty-year lease upon the property, which must be conducted as to finances, operation and rates in all respects as the state decrees. While the state will collect through its tax department the assessments levied upon property benefited by the improvement, this money being applied to interest on bonds, a sinking fund and reimbursement to the state for its expense, the state is not liable for either principal or interest on the bonds, which are to be issued by the regulatory district commission.

Power-Line Telephony

Consumers' Power Installs System at Jackson and Battle Creek, Mich., to Cover 600 Miles

THE feasibility of telephoning over power transmission lines received another demonstration last week when executives of large power companies from various sections of the United States formally opened a high-frequency automatic telephone system just installed on the lines of the Consumers' Power Company of Michigan by engineers of the Westinghouse Electric & Manufacturing Company. Only two sets are completed, these being at Jackson and Battle Creek, Mich. Four similar sets are to be installed, and in all there will be 600 miles of transmission line utilized for telephone service when the system is completed.

In the system as worked out two frequencies are used. The dispatcher's set transmits approximately 50,000 cycles and receives 60,000 cycles. The transmitter at Battle Creek transmits 60,000 cycles and receives 50,000 cycles. In effect, there are two transmitting sets and two receiving sets in service, working through single telephone instruments, with the result that the service is duplex and both parties may talk and listen simultaneously.

To communicate with Battle Creek the load dispatcher at Jackson has only to lift his telephone receiver from the hook. This automatically lights the tubes and starts up the radio transmitting apparatus about half a mile away in the Jackson steam plant of the company. The dispatcher then turns the dial on his instrument to the number assigned to the Elm Street steam plant in Battle Creek. The operation of this dial sends out modulated high-frequency impulses over the high-tension transmission line through a sending antenna strung parallel to the power line for about 1,000 ft. These impulses are picked up on the receiving antenna at the Elm Street plant and cause a selector there to step around and stop at the proper point, and, through the operation of a system of relays, a bell is rung or a horn sounded in the booth of the Battle Creek station.

Tests are said to have shown that in event of line failure the radio impulses jump the gaps and communication is not interrupted even when several miles of the transmission line is down. It is further claimed that communication between Jackson and Battle Creek has demonstrated that even lightning storms, which will interrupt service momentarily on the transmission lines, have no effect upon communication by high-frequency telephony.

Reaching Outlying Substations

When the system is extended all the outlying substations will use the same transmitting and receiving frequencies or wave lengths as Battle Creek; that is, the dispatcher will be able to talk with any station merely by dialing the proper call number of his desk telephone. Under this arrangement outlying stations would not be able in normal conditions to talk with each other, but by going a step farther in working out the intricate system of relays and wave-changing switches any substation operator, by dialing the number 10 on his telephone, will automatically cut in a spare set of tuning condensers for receiving and change his transmitting wave length so that he can talk with any or all other stations. Another detail of the installation is the arrangement of extra selectors at the various substations, through which the dispatcher, by dialing a general call number on his telephone, will ring all substations on the system and be able to transmit emergency orders simultaneously to all substation operators.

The high-frequency apparatus, or the radio units of the system, are installed at the various terminal stations. Two antenna wires are strung for a short distance on the towers which support high-tension power lines. One of these is a sending antenna and one is used exclusively for receiving. The antenna wire is given about 12 ft. clearance from the power-line wire. The upper or transmitting antenna is connected to the transmitting set and the lower antenna to the receiving set.

Frank A. Leach, Jr., Succeeds the Late J. A. Britton

Frank A. Leach, Jr.. former manager of the East Bay division of the Pacific Gas & Electric Company and more recently vice-president in charge of public relations and service, has been named vice-president and general manager of the company to fill the vacancy caused by the death of John A. Britton. The appointment was made by the directors on June 12.

New Officers for Canadian Electrical Association

At the executive meeting of the Canadian Electrical Association held subsequent to the convention at Montreal the following officers were elected: President, P. T. Davies, Southern Canada Power Company, Montreal (re-elected); vice-presidents, R. J. Beaumont, Shawinigan Water & Power Company, Montreal (re-elected); W. Paxton Little, Canadian Niagara Power Company, Niagara Falls, Ont., and J. B. Woodyatt, Southern Canada Power Company, Montreal; treasurer, C. Johnstone, Southern Canada Power Company, Montreal (re-elected); secretary, Louis Kon, Montreal Light, Heat & Power Consolidated, Montreal (re-elected). A. P. Doddridge, Quebec Railway, Light, Heat & Power Company, Quebec; M. A. Pooler, New Brunswick Power Company, St. John, N. B., and J. E. Tanguay, Public Service Corporation, Quebec, were elected members of the executive committee, succeeding W. L. Weston, W. Paxton Little and J. B. Woodyatt. The other members of the executive committee were re-elected. They are N. S. Braden, W. A. Bucke, A. B. Cooper, A. A. Dion, A. Monro Grier, K.C., W. O'Brien, M. K. Pike, J. C. Smith and W. H. Winter.

Iowa Authorities Talk About Rates and Valuations

Public utility representatives, attorneys, legislators and city officials from all parts of Iowa attended the first public utility rate-making conference sponsored by the College of Law at Iowa State University, which was held at Iowa City last week, and joined in an honest effort to set forth the problems of fair rate making and utility regulation.

Nathaniel T. Guernsey, vice-president American Telephone & Telegraph Company, asked for a fair division of the profits between the utilities and the consumers that will enable utilities to compete in the money markets for the tremendous amount of capital demanded annually. "The contention that because capital invested in public utilities is devoted to a public use it is therefore not entitled to relatively the same return as capital in private investments," he said, "will never be sound as long as the laws of demand and supply remain effective." He thought there was danger of over-regulation. Unless regulation is worth more than it costs, he said, it cannot be justified.

William Chamberlain, Cedar Rapids, general counsel of the United Light & Railways Company, gave a comprehensive outline of utility regulation in Iowa, which, he said, is the only state in the Union where the powers of regulation are delegated to every incorporated town. This system has proved superior in years of practice to that employed in many states where elaborate commissions have been created. It can only function, however, where the utility service is purely local in character. The weaknesses of the Iowa system as outlined by Mr. Chamberlain concern chiefly large electric distribution systems. "The growth of the electrical distribution systems to the point where a hundred towns or more are supplied from one distant point makes the local inquiry for rate-making purposes altogether inadequate," he said.

The importance of thorough valuation inquiries in determining what shall be fair rates for public utilities was dwelt upon by Dean William G. Raymond of the State University College of Engineering. Dean Raymond attacked the popular impression that a valuation inquiry is merely an engineer's guess or judgment of values. "Values are worked out with the utmost care, following economic laws so far as these apply and guided wholly in disputed questions on law by the attorneys who manage the cases, and are in all cases, when made by reputable and competent engineers, honest and fair estimates wholly without fictitious values of any kind," he said.

Other speakers were City Attorney O. N. Elliott of Cedar Rapids, Assem-

blyman C. F. Clark of Cedar Rapids, Mayor Alfred C. Mueller of Davenport and Commissioner Dwight N. Lewis of Des Moines.

Activities of New England Information Bureau

Plans for the establishment of a speakers' bureau this fall and a record of increasing activity during the past year are contained in the second annual report of the New England Bureau of Public Service Information, recently made public by Director Joseph B. Groce. A total of 129 utilities in New England are contributing to the support of this bureau, a gain of thirteen over the past year.

At present about three thousand copies of the bulletin issued by the bureau are being printed weekly, the circulation having doubled. The increase is due to an enlarged demand from contributing companies and also from utility executives outside New England. Nearly three hundred copies a week go to investment banking houses and are placed in the hands of security salesmen for their educational value.

Another Public Utility Information Committee

The Louisiana-Mississippi Committee on Public Utility Information is the latest body of its kind to be organized and will be the twenty-ninth in the nation. W. J. Aicklen is chairman. The membership includes the principal public utilities of the two states, embracing electric light and power companies, electric railways, gas, telephone and water companies. Executives from most of the larger towns attended the first meeting, held at New Orleans last week, and it is expected that virtually all the utility companies will join as soon as the work gets under way.

Dr. H. M. Blain, head of the department of journalism of Tulane University, New Orleans, who has had several years' experience in newspaper work and advertising, has been named director, with Sam B. Dunbar as assistant director. Headquarters of the committee are at 420 Maison Blanche Annex, New Orleans.

Overhead-Line Material Specifications Before A. E. S. C.

The American Electric Railway Association has submitted its specifications for overhead-line material for action by the American Engineering Standards Committee, to determine the question of sponsorship and to arrange for the submission of the specifications already developed by the A. E. R. A. to a duly organized sectional or working committee, which will make such revisions and additions as may be necessary to bring these specifications up to the full status of an "American standard." The special committee to consider the question of sponsorship and scope of the specifications, which are also of direct interest to other than electric railway interests, is headed by A. H. Moore, representing the Electrical Manufacturers' Council on the A. E. S. C., and includes representation from the National Electric Light Association, American Railway Association, Electrical Manufacturers' Council, American Institute of Electrical Engineers, American Electric Railway Association, American Short Line Railway Association and the Bell Telephone System.

The attitude of the A. E. R. A. in submitting its specifications for this action by the A. E. S. C. will very definitely favor the unification and elimination of conflicting specifications in this field, which is a very important one to a large group of industries and involves expenditures of great magnitude annually in construction, maintenance and replacement of power, light, telephone, telegraph and railway signal lines.

Brief News Notes

Wabash Valley Electric Company Established. — The long-pending consolidation of eight Indiana public utilities as the Wabash Valley Electric Company, which was for a time vigorously fought, was finally authorized by the Indiana Public Service Commission in an order issued June 28.

Electrical Show for Scranton.—The Electrical Association of Scranton, Pa., is planning to conduct an electrical show there possibly early in November. Full information can be secured from F. L. Smith, chairman show committee, 250 Wyoming Avenue, Scranton, or E. H. Reif, president of the Electrical Association, 119 Franklin Avenue, Scranton.

Public Ownership Movement in Washington.—A campaign which has for its object the construction of electric power lines throughout the State of Washington to be served by publicly owned plants has been launched by Oliver T. Erickson, chairman of the utilities committee of the Seattle City Council. Mr. Erickson contends that the city's Skagit development will ultimately produce 550,000 hp., which can be disposed of at a low rate to the factories, homes and farms, after the plan of the Hydro-Electric Power Commission of Ontario.

Kankakee Plays Safe.—The danger of Kankakee, Ill., ever being left without electric light and power, even in the greatest emergency, has been practically eliminated by the completion of the Joliet and Wilmington transmission line by the Public Service Company of Northern Illinois. This direct line from Joliet gives Kankakee 5,000 kw. more than heretofore, or, in other words, the city has double the electric power at its disposal that it had before the line was completed. Kankakee now receives electricity over three lines from as many different directions.

Washington to Retire Gas Lamps.—A program calling for expenditure of $1,500,000 on the Washington street-lighting system in the next five years has been agreed upon by the committee of experts that is preparing a plan for the Commissioners of the District of Columbia. The program calls for gradual elimination of gas street lamps and the substitution of modern electric lights. It also contemplates the erection of more elaborate posts on Pennsylvania Avenue and other main thoroughfares.

American Capital for Austrian Electrification Sought.—Representatives of Austrian provinces are in the United States seeking American financial aid in the development of power projects in that country the aim of which is to bring about the electrification of practically all the railway systems in Austria and furnish power for numerous industries there. The difficulty of obtaining adequate supplies of fuel has resulted in seriously handicapping industry throughout that country, and it is contended that the electrification of the railway companies, as well as the electrification of industrial plants, would revolutionize the commercial and industrial situation.

Electrical Progress at Chihuahua.—Formal transfer of the electric power plant and street railway system at the city of Chihuahua, Mexico, to the Mexico Northern Power Company by Juan Creel and his associates will take place Aug. 1, it is announced. In the meanwhile the Mexico Northern Power Company will construct a power transmission line from its hydro-electric plant at Boquilla to Chihuahua for the purpose of furnishing lights and power for domestic use and to operate the street railway. The construction of the power transmission line will be finished about Dec. 1, it is expected. The street-railway system will be extended and the city will have a twenty-four-hour electric lighting service.

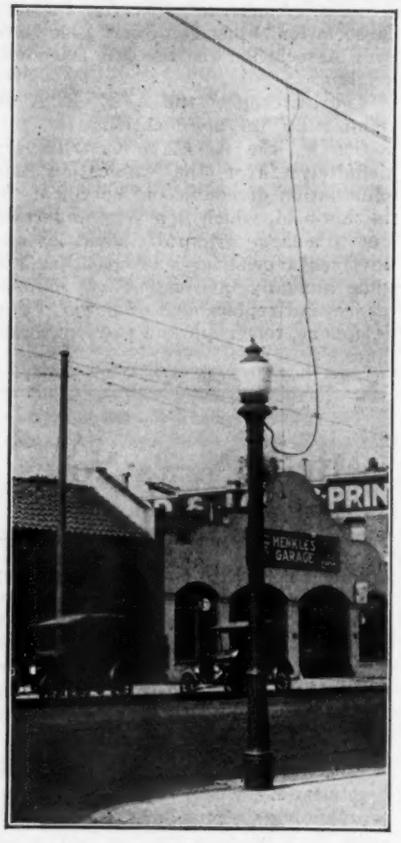
Opposition to Competition in Indianapolis Still Waged.—The Indianapolis Light & Heat Company and the Merchants' Heat & Light Company have appealed from the Superior Court to the Indiana Supreme Court for an injunction to prevent the Indiana Public Service Commission from permitting the Terre Haute, Indianapolis & Eastern Traction Company to enter the Indianapolis power field. Asserting that the entry of the traction company into the general service business will mean an increase of rates to the consumer, "since it is a well-settled law that the utility companies are entitled to rates sufficient to yield a reasonable annual return on the value of their property," President C. C. Perry of the Indianapolis Light & Heat Company declares his desire to have the case reviewed by the courts on its merits.

Electrical Near East Relief.—The cheapest public utility in the world, it is said, is in a little refugee town of Russian Armenia, Djelal-Ogli, where the electric light plant generates power for the population of four thousand people at a total cost of $100 a year. The economy of cost came about quite by accident. A dynamo was discovered in the midst of some old ruins by Major R. M. Davidson, the American director in charge of Near East relief, who also found an abandoned watermill. Among the refugees there chanced to be an Armenian who once worked in the Edison shops in Pennsylvania. He assisted Colonel Davidson in harnessing the dynamo to the water power of the mountain stream along which Djelal-Ogli is built, and not only was the town lighted but part of the region was made productive by irrigating the tract allotted to the Near East relief association for raising food for the orphanage established in the town and for teaching the boys the Western principles of husbandry.

Electric Smelter May Produce 1,500 Tons Daily.—An electric smelter designed to have an ultimate capacity of 1,500 tons daily is to be constructed soon at Utah Junction, Col., by the American Electric Smelters & Refining Company. The first unit to be installed will have a capacity of 100 to 150 tons daily. Other units will be added as they are needed. Frank P. Bertschy, president of the smelter company, has announced that the company plans the transformation of one of the coal furnaces now in use in Utah Junction into an electric furnace. It is Mr. Bertschy's belief that within a year and a half the smelter will have a capacity of 1,500 tons daily. A study of the electrification of the smelter is being made by Robert M. Keeney, industrial heating engineer of the Westinghouse Electric & Manufacturing Company. It is the contention of the designers of the plant that it can be operated more cheaply than a blast-furnace smelter.

Columbia (S. C.) Company Opposed to Canal Project.—The Columbia Canal Commission in South Carolina has rejected an offer from the Columbia Railway, Gas & Electric Company to pay $75,000 to the state for release from its contract to complete the Columbia canal and to build a large hydro-electric plant near Columbia. The canal commission has delivered an ultimatum to the utilities company requiring it to begin work on the completion of the canal within sixty days. The company has ten days in which to answer. The commission takes the ground that it has no authority under the resolution appointing it except to bring about the completion of the canal or to prosecute the company if it fails to carry out the work. Since the company holds that completion of the canal would be a "useless waste of money," it is expected that the matter will go to the courts for final settlement. In making its offer of $75,000 to be released from any claims by the state the company did not admit liability for construction of the canal, but made the offer to secure a settlement and avoid litigation.

Street Posts Fed from Overhead Circuit.—The cost of installation of the street-lighting posts on Colorado Avenue, in Pasadena, Cal., was kept down by supplying service from an overhead circuit as shown here. The two-wire circuit feeding the posts is strung on



the trolley-span wires and a flexible duplex drop enters the hollow posts near the top through a porcelain bushing.

Progress of Railroad Electrification in England. — According to United States Consul-General Robert P. Skinner, electricity will before long take the place of steam power on several hundred miles of railroad in the south of England and the Midland counties. Two of the routes on which it is planned to begin electrification immediately form part of the Southeastern & Chatham system and total more than 120 miles. These will be the basis for a more extensive electrification in the future. It is expected that the work will require about three years for completion. On the London, Brighton & South Coast Railway the plans cover the electrification of the lines from London to Brighton (50 miles) and ultimately the whole of the London-Brighton area. Within the next two years the electrification of the three lines from Waterloo to Guildford (London and South Western Railway) will be completed. The London, Midland & Scottish group are beginning the change-over on Manchester region lines.

Associations and Societies

National Council of Lighting Fixture Manufacturers Elects New Officers.—Herman Plaut was elected president, D. C. De Lancey vice-president and B. F. Klein treasurer of the National Council of Lighting Fixture Manufacturers at its recent Buffalo convention. Charles H. Hofrichter of Cleveland is secretary.

Spokane Section, A. I. E. E.—These officers have been elected by this section for the coming year: Chairman, E. R. Hannibal, Interstate Utilities Company; vice-chairman, G. S. Covey, Washington Water Power Company; secretary-treasurer, J. S. McNair, Washington Water Power Company. The executive committeemen elected are Joseph Wimmer, J. W. Hungate, J. B. Fisken and H. L. Melvin.

National Electrical Credit Association.—At the annual meeting of this association, to be held at the Copley-Plaza Hotel, Boston, on Aug. 9 and 10, Charles M. Wilkins will review the first quarter century of the organization; E. W. Shepard of the Western Electric Company will speak on the relation of credit to capital investment; S. E. Kennedy of the Central Electric Company, Chicago, on how new lines of merchandise affect credit; J. S. Thomas of the Elliott-Lewis Company, Philadelphia, on how mercantile agency reports can be improved, and Wallace B. Domham on business and laws as related to credit and collection. Addresses will be made also by Governor Cox of Massachusetts, Paul Hollister of Boston and other prominent men.

Coming Meetings of Electrical and Other Technical Societies

[A complete directory of electrical associations is published in the first issue of each volume. See July 7 issue, page 56, for latest list.]

National Electrical Credit Association—Boston, Aug. 9-10. F. P. Vose, 1347 Marquette Bldg., Chicago.

New England Division, N. E. L. A.—Swampscott, Mass., Sept. 6-8. Miss O. A. Bursiel, 149 Tremont St., Boston.

Rocky Mountain Division, N. E. L. A.—Glenwood Springs, Col., Sept. 17-19. O. A. Weller, 900 15th St., Denver.

Association of Edison Illuminating Companies—Dixville Notch, N. H., Sept. 17-21. P. S. Millar, 84th St. and East End Ave., New York.

Michigan Electric Light Association—Grand Rapids, Sept. 18-20. Herbert Silvester, Detroit Edison Co., Ann Arbor.

Illuminating Engineering Society—Lake George, N. Y., Sept. 24-28. S. G. Hibben, 29 West 39th St., New York.

Association of Iron and Steel Electrical Engineers — Buffalo, Sept. 24-28. J. F. Kelly, 513 Empire Bldg., Pittsburgh.

Indiana Electric Light Association—French Lick Springs, Sept. 26-29. T. Donahue, Northern Indiana Gas & Electric Co., Lafayette, Ind.

American Electrochemical Society—Dayton, Ohio, Sept. 27-29. Colin G. Fink, Columbia University, New York.

American Institute of Electrical Engineers—Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

Association of Electragists International—Washington, Oct. 8-13. Farquson Johnson, 15 West 37th St., New York.

Commission Rulings

Power Company Ordered to Continue Service to Irrigation District Despite Default in Payment.—The Public Service Commission of Oregon has ordered the Idaho Power Company to continue service to the Payette Oregon Slope Irrigation District despite its failure to pay for the power delivered in 1922 and a balance due for 1921, amounting to a total indebtedness of more than $26,000. The commission holds "that it would be unjust and unreasonable on the part of the defendant to insist upon a cash payment from plaintiff at the present time as a condition precedent to the continuation of furnishing power for the current year, and it would be unreasonable and indefensible to permit the Idaho Power Company to discontinue the service for the crop season of 1923, provided plaintiff will first furnish to defendant adequate security for prompt payment thereof, particularly in view of the fact that plaintiff is a quasi-municipal corporation and has the power of taxation and therefore the ultimate payment of the money for this service is assured." The commission took note of the fact that "the conditions among the farmers, not only of said district but in the entire State of Idaho and that part of Oregon contiguous to Idaho, including the district in which plaintiff is operating, have been such that they have not been able to pay their bills during the years 1920, 1921 and 1922; and, in order to prevent the lands in said territory from going back to the desert condition, the defendant company has been compelled to extend credit in very large sums of money. But," the commission said, "it has not been compelled as a matter of law to do so, but by the necessity of the case, from the fact that its own interests are so interwoven with the irrigation districts, it has done so. A corresponding obligation on the part of the irrigation districts and the farmers therein requires that they should make every effort possible to secure the defendant."

Depreciation Under Investment-Cost Method.—The Public Service Commission of West Virginia in valuing the property of the Appalachian Power Company for rate-making purposes had this to say on depreciation allowance: "In ascertaining the value of a utility for rate-making purposes by the investment-cost method, depreciation does not apply in the same manner as it does in ascertaining the value by the reproduction new cost method. If investors skillfully and judiciously locate and construct a plant, operate it economically and maintain it efficiently, they are entitled to have their investment kept intact and undiminished by wear, deterioration or obsolescence unless the amount that the investment may have been diminished has been returned to the investors. The record shows that the plant of the defendant company has been wisely and judiciously located, planned and built, that the plant has been efficiently operated and maintained, and that the plant is in the nature of a perpetual utility, the termination of the life of which cannot be comprehended at this time. If all the units of the plant were of comparatively small cost, the investment could be kept intact and protected by a reasonable annual maintenance expense. Defendant's plant consists of many large and expensive units. When these large units have to be replaced, by reason of wear and deterioration or by reason of obsolescence, the expense of such replacements will be too great to be met by a reasonable annual operating expense. The active life and use of these large units are being consumed by the present patrons of the utility. It is the duty of these patrons to contribute to the defendant company a sufficient amount of revenue to pay operating expense and taxes, to maintain efficiently said plant, to provide a reasonable return upon the present fair value of the plant and to create a fund out of which said large units may be replaced so that the value or corpus of the plant of the investors will not be reduced."

Recent Court Decisions

Jury's Discretion in Fixing Damages.—Sustaining, in Maloney vs. Wisconsin Power, Light & Heat Company, a verdict of $9,000 damages to the widow of a man sixty years of age and earning not more than $3,000 a year, for whose death the company had been held responsible, the Supreme Court of Wisconsin said that in fixing damages the jury is allowed a wide discretion and where the trial court passes upon the question of damages the appellate court cannot upset the verdict. (193 N. W. 399.)*

Recovery of Damages Refused Where One Presumption Is Built Upon Another.—Quashing the record of the Court of Appeals, the Missouri Supreme Court, in State ex rel. Missouri Public Utilities Company vs. Cox, declared that in this case, where deceased was found lying dead directly under a high-tension electric wire, which would have been from 5½ ft. to 6 ft. above his head if he had been standing erect, and near a guy wire which, if swung by the wind, might have come into contact with live wires, liability could not be predicated upon a presumption that deceased touched the guy wire and that this was pushed or blown into contact with the high-tension wires, since to do so would be to base one presumption upon another in order to permit a recovery. In the absence of any showing of facts on which a charge of negligence might be based, the company could not be found guilty of negligence under the doctrine of *res ipsa loquitur* (the thing speaks for itself). (250 S. W. 551.)

Power of Receiver to Fix Rates.—In City of Minneapolis vs. Rand the United States Circuit Court of Appeals has modified a decree entered by the District Court and fixing rates for a gas company. The Circuit Court holds that the courts are without power to change rates fixed by a legislative body, but that a court which has appointed a receiver for a company may, on petition by the receiver for instruction, fix the rates to be charged by him during the receivership. The court said, among other things: "The gas company is entitled to the fair value of its property, even though that value has been increased as a result of the war, just as the laborer, the merchant, the manufacturer, the owner of land and the lender of money may require the prevailing prices for what they furnish. We recognize the practical difficulty in fixing this fair value to apply to the years 1920 to 1923, inclusive, if occasion requires the valuation to continue so long, inasmuch as the value fixed by the witnesses as fair for Jan. 1, 1920, may prove not to be the fair price thereafter. The valuation to be made is in part based upon experience and observed prices and in part upon prophecy of the range of prices for several years thereafter." (285 Fed. 818.)

Inter-Utility Contracts Not Subject to Nullification Unless Other Customers Are Discriminated Against.—Contract rates for electrical energy supplied by the Kansas Gas & Electric Company to the Wichita Railway & Light Company and two other railway companies having been raised by the Court of Industrial Relations, the litigation was carried to the Supreme Court of Kansas, which sustained the district court in upsetting the ruling of the regulatory body, declaring that if the revenue receipts under such contracts affect only the net profits or dividends on that portion of the power company's property used and useful in serving the traction companies, and do not require recoupment at the expense of other customers nor impair the service rendered to the public, there is no occasion or excuse for the intrusion of the state's police power to abrogate the contracts. The public utilities act did not automatically abrogate contracts between public service companies. The temporary high price of fuel oil, which made up 90 per cent of the cost of generating electricity but did no more than cause a temporary loss of dividends, and which high price was not likely to continue, was not, the court held, a fair and sufficient basis for increasing the rates for electrical energy to be exacted by the company, especially when the existing contract rates had been fairly profitable for a considerable period of years. (214 Pac. 799.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

Dr. Harper Takes Up McAllister's Work on Standards Committee

Dr. A. S. McAllister, engineer physicist with the Bureau of Standards, who during the past two years has been liaison officer of that bureau and the Federal Specifications Board assigned to the headquarters of the American Engineering Standards Committee at New York City, has been recalled to Washington for special work by Secretary Hoover of the Department of Commerce. Dr. D. R. Harper, 3d, physicist of the Bureau of Standards, has been assigned to the American Engineering Standards Committee, succeeding Dr. McAllister. Dr. Harper is a graduate and former instructor of the University of Pennsylvania and has been associated with the Bureau of Standards since 1909. He has specialized in thermometry and heat measurements, particularly in heat transmission and in internal-combustion-engine physics. Dr. Harper will be concerned with those standardization projects in which the Bureau of Standards and the Federal Specifications Board are co-operating with the A. E. S. C.

Joseph E. Michaud, member of the provincial government of New Brunswick without portfolio, has been appointed a member of the New Brunswick Electric Power Commission. The appointment was made at a meeting of the Cabinet on July 6 when the resignation of L. A. Dugal of Edmundston as a member of the commission was received and accepted. Mr. Michaud will take up his new duties immediately.

Col. William Kelly, the chief engineer of the Federal Power Commission, will reach Washington July 17 after a two months' stay in Europe. He will arrive in time to confer with O. C. Merrill, the executive secretary of the commission, prior to the latter's sailing for London to assist in the arrangements for the World Power Conference. Mr. Merrill will be accompanied by J. B. Challies, the director of the Water Power Branch of the Canadian government and chairman of the Canadian committee of the World Power Conference. Mr. Merrill will return to Washington Aug. 15.

A. K. Ellis, for many years secretary, treasurer and general superintendent of the Wisconsin Traction, Light, Heat & Power Company, was elected general manager, secretary and treasurer of the company at a meeting of the directors held recently in Milwaukee. Not long ago the company was purchased by the North American Company, New York. S. B. Way, vice-president and general manager of the Milwaukee Electric Railway & Light Company, was elected vice-president and a director of the Wisconsin Traction, Light, Heat & Power Company at the same meeting. The Milwaukee company is controlled by the Wisconsin Edison Company, which in turn is controlled by the North American Company.

R. M. Howard Heads North Central Division of N. E. L. A.

R. M. Howard, who was elected president of the North Central Geographic Division of the National Electric Light

R. M. HOWARD

Association at its convention held recently in Minneapolis, has completed twelve years of service with the Wisconsin Railway, Light & Power Company, Winona, Minn., and is at present one of its vice-presidents. His experience in public utility work covers a period of more than thirty years and includes the railway, light, hydro-electric and gas fields. He began his apprenticeship in Davenport, Iowa, where his father was manager of the Davenport Central Railway, one of the first street railways to be electrified. Ten years spent in the electric and machine shops there gave him a thorough training in the practical end of the work. Mr. Howard was manager of the Clinton (Iowa) Street Railway Company for ten years, during which time the tracks, barns, overhead lines and power circuits were completely rebuilt. Previous to his association with the Wisconsin Railway, Light & Power Company, he was vice-president and general manager of the Northern Hydro-Electric Power Company, the Green Bay Gas & Electric Company and the Green Bay Traction Company, which have since been combined into the Wisconsin Public Service Company.

Luncheon to Dr. E. F. Hyde

A farewell luncheon was tended to Dr. Edward F. Hyde, recently director of the Nela Research Laboratory, National Lamp Works of the General Electric Company, Cleveland, on Friday, July 6, by the officers and directors of the Illuminating Engineering Society on the occasion of his departure for Europe. In the unavoidable absence of Ward Harrison, retiring president of the society, Samuel G. Hibben, the secretary, presented Dr. Hyde with resolutions expressing the appreciation felt by the members for his work, wishing him the greatest degree of success and commissioning him as a special representative to report to the society regarding progress abroad and to suggest means of co-ordinating more effectively with European activities.

In responding, Dr. Hyde referred to his extended trip abroad as a sabbatical leave which had been accumulating for twenty-one years and recalled that the age of the Illuminating Engineering Society corresponded exactly with his period of active association with illuminating engineering. His plans, he said, would take him first to Switzerland, where he expected to spend the remainder of the summer, and he would then go to southern France for the winter months. He is accompanied by Mrs. Hyde.

Letters of regret were received from all the directors and officers of the society who could not be present. Those at the luncheon were Dr. Alexander Duane (an associate of Dr. Whitney), George G. Ramsdell, Preston S. Millar, L. B. Marks, Norman Macbeth, Samuel G. Hibben, D. McFarlan Moore, F. M. Feiker, W. J. Serrill, John W. Lieb, George H. Stickney, Alvin L. Powell and Dr. Ralph C. Rodgers.

Sir Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, has been made a minister without portfolio in the government just formed by Premier George H. Ferguson in succession to the defeated Drury administration.

George Kidd, general manager of the British Columbia Electric Railway Company, Vancouver, B. C., was appointed president of the company by the board of directors at a recent meeting in London, England. Other appointments include W. G. Murrin, assistant general manager, as vice-president and A. T. Goward, manager of the Vancouver Island system, as vice-president at Victoria. These changes are the result of the recommendations of Sir Ernest M. Harvey, who made a recent visit to the company's properties in British Columbia, and were made in order that the titles of the executive officers should more clearly define their powers and responsibilities. No change in duties will take place. Mr. Kidd will remain in charge of the company's entire policies, holding power of attorney from the board of directors in London; Mr. Murrin will be in charge of the actual

operations on the mainland of British Columbia, and Mr. Goward will be in charge of operations on Vancouver Island. R. M. Horne-Payne is chairman of the board of directors as before.

Truman and Elias New Division Managers

J. H. Truman, Jr., has been appointed division manager of the Pennsylvania Power & Light Company at Allentown, Pa., in charge of the territory lying west and north of the Lehigh County line and to be known as the Allentown division, and D. A. Elias has been made division manager of what is to be known as the Bethlehem division, comprising the territory adjoining the Allentown division on the east. These territories were heretofore one unit, known as the Lehigh division, and were in charge of A. H. S. Cantlin, who has been transferred to the commercial department on special commercial engineering work covering the entire territory of the company.

Mr. Truman was graduated from the University of Illinois in the College of Electrical Engineering in 1911 and became associated with the Commonwealth Edison Company of Chicago, and later with the Central Illinois Public Service Company of Springfield, Ill. In 1919 he was appointed division manager of the Ohio Service Company at New Philadelphia, Ohio, retaining this connection during the ensuing four years prior to going to Allentown.

Mr. Elias was graduated in electrical engineering from Pennsylvania State College in 1908, and since 1910 has been associated with the United Service Corporation, Scranton, Pa., in the management of various properties. For a number of years he was in charge of the East Penn Gas & Electric Company, Bristol, Pa., which property was recently sold by the United Service Corporation.

George Stringfellow, formerly representative of the Edison Storage Battery at Washington, D. C., has been appointed general sales manager of the company. Mr. Stringfellow assumed the duties of his office on July 1.

Clarence E. Morrow, who has been connected with the corporation department of Merrill, Oldham & Company, investment bankers of Boston, since 1921, examining and reporting on properties whose securities were handled by that organization, has joined the Guaranty Company of New York in charge of the public utility bond division. Mr. Morrow will be associated with negotiations for the purchase of public utility bonds which are underwrritten by that company. He was graduated in 1910 from Whitman College and in 1912 from the Massachusetts Institute of Technology, where he became an instructor. For several years Mr. Morrow was chief draftsman with Stone & Webster, Inc., and subsequently engaged in appraisal and report work with electric properties.

C. L. Law New President of I. E. S.

Clarence L. Law, who was recently elected president of the Illuminating Engineering Society, as was announced in the July 7 issue of the ELECTRICAL WORLD, has specialized in lighting work since he entered the electrical industry in 1907, when he became associated with the New York Edison Company as a special inspector. Later he was made illuminating engineer with the duties of designing, lighting and wiring for commercial and industrial installations as well as exterior lighting. In 1910 he was made manager of the bureau of illuminating engineering, and in the spring of this year he was appointed assistant to the general commercial manager. Mr. Law has been a prominent figure in the society he has been elected to head. From 1915 to 1917 he served as vice-president and from 1917 to 1922 he was its general secretary.

C. L. LAW

His activities in the National Electric Light Association include the chairmanship of the Lighting Sales Bureau and of the industrial exhibits committee and the vice-chairmanship of the metropolitan New York company section. Mr. Law is also a member of the American Institute of Electrical Engineers and of the New York Electrical League.

Walter C. Whitaker, formerly connected with the Bureau of Power and Light, Los Angeles, is now associated with the General Electric Company in that city.

M. F. Behar has recently been made advertising manager of the Edison Storage Battery Company. Mr. Behar is succeeding Paul Sutcliffe, who has gone to California because of ill health.

Herman Plaut, president of L. Plaut & Company, manufacturers of lighting fixtures, and owner of Black & Boyd, designers and dealers in fixtures, New York City, has been elected president of the National Council of Lighting Fixture Manufacturers. Mr. Plaut has been a prominent figure in the council, having served as a director and for three years as president of the New York Section. He has also been active in the Illuminating Engineering Society.

Percy H. Whiting, manager of the securities department of the Central Maine Power Company, has been appointed manager of the customer-ownership division of the securities department of Henry L. Doherty & Company, with headquarters at New York. Mr. Whiting has made a brilliant reputation for himself as a pioneer Eastern developer of the customer-ownership idea in utilities circles, and aside from his effective direction of various campaigns for the Central Maine Company during the past few years, has frequently been retained as a consultant by central-station companies on this class of work. He has been active in the National Electric Light Association and has written extensively on public relations and security sales for the technical press.

Obituary

Charles T. Taylor, who for many years was secretary and treasurer of the William Cramp & Sons Ship and Engine Building Company, Philadelphia, died June 13, after a brief illness. He was 67 years of age. Mr. Taylor, who was a graduate of the University of Pennsylvania, entered the service of the Cramp company in 1892 and became secretary in 1898 and later was also made president. He was also secretary and treasurer of a number of affiliated companies, including the Federal Steel Foundry Company of Chester, Pa., and the De La Vergne Machine Company of New York, and was secretary and treasurer of the I. P. Morris Company until it was merged with the Cramp company. Mr. Taylor was the father of H. Birchard Taylor, vice-president of the Cramp company and president of the Pelton Water Wheel Company.

Louis Rau, founder of the first Edison company to be formed in Europe, died in Paris, France. When in 1880 Mr. Rau heard of Edison's electrical discoveries he made a hurried voyage to America in order to negotiate with Mr. Edison for their early introduction in France and adjacent countries. Upon his return to France he organized the French Edison Company, officially known as the Société Electrique Edison and later the Compagnie Continental Edison. As founder of the first Edison company in Europe he became its president and remained so during his life. His keen interest in electrical matters and early appreciation of the development of water power as a source of energy led him to organize the Société Hydro-Electrique de Lyon, of which he was president, thus helping to create one of the first large installations for the harnessing of water power. It was to Mr. Rau more than any other individual that the organization of the German Edison Company, Berlin, in 1883, one of the most influential electrical enterprises in Central Europe, was due. Mr. Rau was an honored member of the Edison Pioneers.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

Delay in Changing the Code*

The Natural Resistance to Change that Comes from the Manufacturer —How "Special Supervision" and a More Liberal Inspection Might Help

By R. S. Hale
Chairman N. E. L. A. Wiring Committee

THE question has been asked: Why has it taken so long to bring about the changes in opinion within the industry that are now to be put into the National Electrical Code? The answer is that the central stations benefit only indirectly from savings in the cost of wiring. We can get no benefit until our customers have saved the money and then only if they utilize the savings to take more of our service. Obviously no single central station can afford to spend the time and money necessary to change general sentiment, though each of us can do something.

Resistance to Change

Even the N. E. L. A. wiring committee, representing all the central stations in the association, has been greatly handicapped by the fact that the other branches of the industry—or, rather, some individual members, such as individual manufacturers, contractors and inspectors—benefit financially from delaying improvements. A manufacturer, a contractor or an inspector who has developed his business and developed his skill according to one method necessarily suffers a financial loss if he is asked to change to an improved method. The longer he can delay the improvement the more money he can make out of his skill at the old method.

If it had been necessary to get a code changed before we could have used turbines instead of reciprocating engines, the reciprocating-engine people would not have helped to get such rules changed, and reciprocating engines would have stayed with us, just as 6-amp. fuses, on account of the code, remained in use long after 10 amp. was known to be safe. Even when individual manufacturers, contractors and inspectors are public-spirited enough to welcome a change, there is, nevertheless, a tremendous inertia which has to be overcome.

This inertia has been helped by the very proper custom and practice that the code committee would not put anything into the code until it had been developed and tried out by field experience and been proved to be satisfactory and safe, while at the same time the inspectors in many districts would not allow anything whatsoever to be even tried unless it was already in the code. The practice of the Electrical Code committee in not putting anything into the code until it had been proved to be safe meets with our commendation.

R. S. Hale

"Special Supervision"

It is the other feature—that is, the practice of the inspectors, or, rather, of some of them, in refusing to allow anything whatsoever, no matter how good, unless it is in the code—that would seem to be unwarranted. Improvements not in the code may properly be made subject to special supervision, but I believe that anything beyond requiring such special supervision as will make them safe is exceedingly bad for the industry. I believe that any good and safe wiring should be allowed under special supervision, whether specifically provided for in the code or not. I believe that there should always be three alternatives—first, the code; second, as good as the code; third, better than the code—and that any of these three alternatives should be allowed.

This does not mean that any Tom, Dick or Harry should decide for himself whether wiring is good or not. It does mean, however, that competent inspection authorities—and they should not be in authority unless competent—may at times decide that they will not allow wiring which is bad even if technically permitted by the code and that they may also at times allow wiring which they thing good even if technically barred by the code. A competent inspection authority should also be competent to decide whose advice it will take. We believe that the central stations and all of us should work co-operatively with the inspectors for safety, and I also believe that construction not in technical compliance with the code, but installed and used under special supervision, can usually be kept safer than the ordinary construction installed without such special supervision.

When there is really a question of safety there is reason for delay, but when it is clearly obvious that safety is not involved, or when it is clearly obvious that the extra supervision will make the improved installation at least as safe as the ordinary one, then the improved method should be allowed. No one seriously objects to this as a principle, but it is often difficult to get down to a clear-cut basis.

When some new and improved method is suggested, the interests who oppose any change are easily able to get up some kind of argument, often plausible, sometimes not even plausible, but an argument, and so long as they can argue on the question of safety they cause delay.

*A recommendation presented before the National Electric Light Association, New York, May 16, 1923.

Developing an Export Business

Asking Specific Questions for Special Lines Brought Wiring-Device Maker's Market Closer—Better Packing Reduced Breakage to Minimum

BY A MANUFACTURER

ABOUT ten years ago I was looking over the consular reports to see the value of electrical exports from the United States and came to the conclusion, with others of our company, that this business could be expanded as regarded our part in it. At that time we were exporting about $17,000 worth of goods yearly from our factory. Today less than 5 per cent of our own gross revenue comes from foreign sources, but we are much interested in the subject and the various steps which we took to develop the business which we handle may be of significance to others.

The first step was to obtain copies of various foreign trade periodicals. We went over these carefully and wrote to every advertiser, asking numerous comprehensive questions about exportation and making it clear that we were "new at the game." We received a magnificent response to these inquiries, and after going over these we wrote direct to many American consuls, taking care to ask specific questions rather than make general inquiries. One of these questions was whether the wires were run in iron pipe in walls in local installations or on the outside surface, and other detailed queries were made in order to throw light upon the exact conditions which prevailed in wiring practice abroad. The consuls responded with excellent service, and in some cases they turned over our letters to local engineers and central stations in order that a more complete answer might be furnished. As a result of this preliminary work we spent no money in trying to cultivate markets without local electrical service and we kept out of markets where the use of our fittings did not seem practicable or likely to become popular. We found that in Great Britain and her colonies there was little disposition to use American wiring-device designs.

South and Central America, Cuba and Mexico appeared the more attractive markets, with potentialities in continental Europe, notably at that time in Italy, Spain and France, with some pre-war Russian outlook.

We then prepared a catalog, carefully illustrated, and devoted considerable effort to securing satisfactory translation of our product terms into Spanish and Portuguese, having the reading matter retranslated into English before final publication. The catalog was issued in these three languages. The preparation of packing slips followed, the printing being in three languages, and after this we made a careful study of packing problems with the fundamental idea of doing as much as possible to prevent breakage. Many tests were made of packing schemes, including dropping from a height of 10 ft. upon a hard floor, and as a result we developed a packing practice which has reduced claims for damages to less than a hundred dollars in ten years, the cost of packing per thousand pieces being about the same as the unit cost of packing for domestic shipment.

Postage stamps were obtained from foreign countries, and we found it very helpful to inclose stamped envelopes to our foreign customers, actual and prospective. We exchanged commercial information about ourselves with various South American representative houses and started our expansion with a fair knowledge of the reputation and credit situation of these people. On the banking side we soon found that we could collect foreign drafts through our local bank, which cleared through the National City Bank at New York and the New York Clearing House. None of our drafts were held up by moratoriums at the outbreak of the war because each one bore on its face "Waiving all moratorium decreed or which may be decreed." At that time we had accumulated many orders three to nine months old, and we asked for a reconfirmation before proceeding to fill them. Ninety-five per cent of these were canceled, and we escaped the experience of many American manufacturers who filled orders at the outbreak of the war only to find the goods thrown back on their hands.

As the export business has developed, we have been convinced more and more that there is a close relationship between what happens in the United States and what goes on in the rest of the world. Gradually an effort is being made to bring the foreign customer to appreciate the value of American standards of design in wiring devices. Cheap goods at lower prices are still strongly welcomed in many countries, and some of the manufacturers in these nations are quoting prices which cannot at present be met here. Friendly and courteous trade exploitation along the lines of quality service appears to be the best outlook for the American manufacturer.

Business Conditions

A Survey of Important Developments in the Electrical Market Including Data on Production, the Sales Outlook, Credits, Exports, the Metals and Other Conditions Affecting Cost, Supply and Demand

SALES of electrical materials throughout the United States are reported as large as those for the corresponding period last year. During the week there have been several decreases in the price of wire, rubber-covered undergoing a cut of 10 per cent throughout the Middle West and Eastern States.

Lamp sales are increasing, the usual 80 per cent of production continuing to the market as replacements. Prices are approximately 16 per cent lower than a year ago, with almost a 15 per cent increase in new business.

The porcelain market in the knob, tube and cleat line continues at a slow pace because of the small amount of such material entering into new construction. Very little wiring of old buildings is being done in the Eastern territory, and the greater part of present business is being placed in the South and Southwest in connection with farm-lighting-plant installations and telephone-line construction. Tubes of the 3-in. size are selling at from $2.50 to $3 per 1,000 in barrel lots.

Conduit prices are firm, with good demand in the East and Middle West. Stocks are cleaned out from week to week, with the mills of Ohio and Pennsylvania struggling to keep up to requirements. What increase in price of conduit will result from the promised ultimate adoption of the eight-hour day in the steel industries is difficult to predict.

Denver Jobbers Report Slight Falling Off in Orders

JOBBERS in the Denver territory report a slight falling off in orders, but this movement has every indication of a temporary nature. Conditions

with the contractor-dealer are improving gradually with the better prices obtained for work. Heating appliances are slow while the fan business is picking up with warmer weather.

Weather conditions and conservatism have to some extent affected the forward trend of business indicated in this district during the earlier months of the year. Heavy rains have retarded farm operations, although damage from floods has been practically negligible as compared with adjacent territory to the east and south. The moisture, however, has been of incalculable benefit to agriculture and live stock, two of the chief industries of the district, and has therefore encouraged general business and banking.

Wholesale distribution of merchandise has been made in large volumes. Mining operations have shown no cessation, while crude-oil production is the highest on record.

Pacific Coast Contractors Report Slower Business

BUILDING permit figures are favorable to the electrical market in southern California, but elsewhere in the Pacific Coast territory contractors report a decided decrease in the number of large jobs. One large firm recently remarked that it had figured on only one set of sizable plans in two weeks' time, yet there is comparatively little non-employment.

Rubber-covered wire prices are rather unsteady, but so far have dropped very little. Railroad business is excellent, particularly in pole-line hardware. Power company business continues good, but slow or impossible deliveries on poles and insulators are the rule. Several large schedule material orders are reported which reflect the increasing manufacturing importance of California.

Electrical Machinery Business Expected to Gain 20 per Cent

ELECTRICAL machinery manufacturers report large unfilled orders at the close of the first six months of this year, which together with detailed accounts of operations for that period indicate that 1923 will be far ahead of last year's business to the extent of approximately 20 per cent. If this 20 per cent rate of increase is realized, it will mean that waterwheel generators totaling 240,000 kw. and turbo-generators totaling 650,000 kw. will be sold in 1923.

Earnings by electrical machinery companies for the first half of this year show only moderate improvement over those of the late months of 1922, but greater profits are expected in the last half of this year. Business as far as incoming business is concerned has been good since the fall months of last year. The past two months have witnessed some slight slowing up, but this is not taken as indicating any slump in the trade, but is rather looked upon as a temporary slowing up following on the heels of large orders earlier this year.

Improved earnings can be expected during the last half of this year reflecting the large amount of unfilled orders now on the books. Although orders began to come in volume more than seven months ago, this was not immediately reflected in larger billings, for the reason that the completion of the heavier class of machinery, including large turbines, takes considerable time. Another factor is that with a shortage of labor and inability to speed up plant operations the early months were comparatively poor ones.

Increased billings during April, May and June were not large enough to offset the early handicap. Earnings for the second quarter of this year showed marked improvement over those for last year.

One Company's Billings an Interesting Example

THIS inability to speed up operations immediately following an influx of orders is exemplified in the case of one of the leading companies. This company now has unfilled orders on its books of approximately $13,000,000, against $8,215,000 at the close of 1922. During the past two months billings have averaged $2,000,000, a gain of $300,000 over the early months. Net profits during the first quarter were equal to 70 cents a share on the $26,000,000 common stock, or 30 cents a share less than the one-dollar quarterly dividend requirement.

The earnings statement of this company for the second quarter, to be published shortly, will show the dollar dividend requirement to have been just about earned in the second three-months period. Current earnings of this company are now slightly ahead of the dividend requirements and are expected to continue so for the rest of the year.

Rubber-Covered Wire Reduced 10 per Cent in Chicago

CHICAGO electrical jobbers report satisfactory business. Several price changes were announced this week. Rubber-covered wire No. 0 and larger was reduced approximately 10 per cent, No. 1 to 6 double-braid stranded 15 per cent, No. 8 and smaller double-braid stranded 9 per cent, No. 4 and smaller single-braid stranded 9 per cent, No. 4 and smaller (solid) 9 per cent, duplex wire 9 per cent and fixture wire 15 per cent. Weatherproof base was reduced 1 cent. Lock nuts and bushings, ½-in. and ¾-in., were reduced 3 per cent. Certain types of motors were increased 10 per cent, while one type of insulator was increased 5 per cent.

Pole-line hardware remains in good demand. Transformer sales are normal for the time of the year and wiring device sales have increased somewhat. Conduit prices are firm and demand is good. The indications are that there will be a shortage in the fall months, due to the fact that in the summer months steel production is at a low ebb, as the hot weather affects this class of work very materially. It is believed that anticipation of future orders would be good judgment. Building permits are about equal to those of last year.

Radio Industry Showing Far More Stability This Summer

THIS time last year the entire electrical industry was watching with keenest interest the apparent paralysis and demoralization of the radio business. The manufacture and sale of radio equipment had grown to phenomenal proportions through the winter and continued until hot weather came, when suddenly with hardly a warning the bottom dropped out of the market and manufacturers, jobbers and dealers were left high and dry, choked with overstock and financially involved by an avalanche of canceled orders. This summer season has been approached, therefore, by the trade with extreme caution, lest the experience should be repeated.

This year, however, radio dealers, and jobbers' shelves are very low in stocks of both parts and complete sets, according to leading authorities in the market. The fear of inflation and consequent great losses has resulted in what is probably one of the most careful buying periods in the history of any commodity of the electrical industry. The demand for radio material, on the other hand, is considerably stronger. There has been no such collapse as was witnessed last season.

David Sarnoff, vice-president and general manager of the Radio Corporation of America, says that sales by his company are greater than last year at this time, and he is of the opinion that this careful buying will undoubtedly lead into a record-breaking year beginning some time within the next two months. "The outlook for radio is most favorable," said Mr. Sarnoff. "Past performances in the radio field coupled with present conditions give promise for the best business ever experienced by the radio dealer, jobber and manufacturer."

Sales of vacuum tubes are proceeding rather slowly, but are in keeping with the general trend of the market, although some dealers in the effort to attract trade are offering tubes at cut prices that allow no profit. No reductions have been made by the manufacturers. Stocks of tubes are sufficient for present needs. More elaborate and attractively designed cabinets are being developed for this year's displays. The concealed type with fewer controls is in increasing demand. Loud speakers with unseen horns are also growing in popularity. Business in parts is gradually falling off owing to the failure of the uninitiated to put together sets that are really efficient and satisfying. Units selling from $25 to $75, with tubes and dry cells, are in most favor.

Broadcasting is developing to new high standards far beyond the efforts of six months ago and is receiving par-

ticularly favorable comment this summer. The latest broadcasting station installed by the Radio Corporation of America, on the roof of Aeolian Hall, New York City, continues to send out two programs simultaneously on different wave lengths. This station cost approximately $225,000 to install and is operating at an expense of $10,000 monthly.

Wooden Pole Firms Unable to Keep Pace with Utilities

REPORTS from the wooden-pole industry indicate boom conditions in which it seems to be impossible for the shippers to keep up with the demand. Following the period of refinancing by utilities in 1922, pole orders began coming in about December of last year and have continued without let-up, so that shipments are being made just as fast as the poles can be taken out of the woods and butt-treated.

Authorities at different centers of pole supplies agree that this is the biggest year in the history of the pole business and predict that the present rate of demand will probably continue for two years more—a guess based on present indications of demand. Practically the entire country is demanding poles on a scale entirely beyond the capacity of the producers.

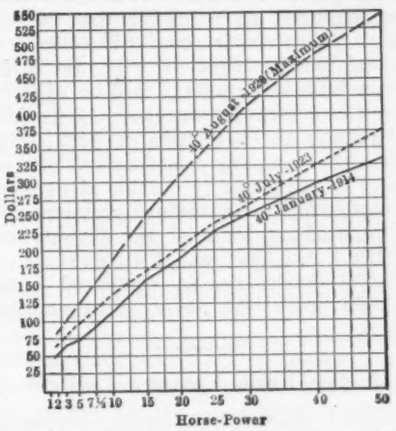
This demand seems to be spread pretty evenly over the country. In Western, Central, Southern and Eastern states utilities are busily engaged in replacements and line extensions; also in the East as far as Connecticut. From Connecticut north the demand is not so marked. It is estimated that about 50 per cent of the poles are being used in replacements and 50 per cent on new lines, many of them interconnection projects.

Virtually all shipments of poles today are being treated for butt preservation. This undoubtedly slows down delivery and is reducing somewhat the number of poles which suppliers can turn out. In the end, however, it will bring economy to the utilities through the conservation of both poles and replacement labor. It is not believed that actually it will make any reduction in the market for poles, since appropriations now spent in replacement work will be expended in purchase for extensions. There has been no change in butt-treating prices since December, 1918. Western cedar prices have not advanced since April 24 last, and no further advance is in prospect. The last price change in Northern cedar was on May 28, 1923, and no further advance is forecast. Both these advances were made to keep pace with increasing cost of labor.

Pole deliveries have been considerably retarded for the last few months by forest fires and delays in transit. A recent fire in Minnesota burned up 5,800 cut poles, all awaiting shipment to utilities, on order. Within the last three weeks floods in the Rockies have carried away bridges or caused washouts in twenty-two places along the main line, over which shipments of Western cedar must pass. Every effort is being made, however, to get the poles out of the woods to the treating yards and on the rails, so that central-station expansion programs may not be held up for lack of this essential material.

Comparison of Present Motor Prices with Pre-War Times

IT HAS been said by authorities that no other industry using any large amount of steel in its production has so completely liquidated war-time advances as has the electric motor industry. It is even believed that this liquidation has actually gone too far, and consequently there is every probability that the present price levels will not only be maintained but in due time will be conservatively increased as the motor industry works its way back to normal-capacity production.



COMPARISON OF RETAIL PRICES OF 40-DEG. SQUIRREL-CAGE TWO AND THREE-PHASE MOTORS AT 1,750 R.P.M.

In discussing recent advances of from 5 to 10 per cent which have been made by the leading electrical manufacturing companies on various types of electric motors, T. T. Richards, vice-president in charge of sales of the Wagner Electric Corporation, called attention to the present price position of the electric motor industry as compared with pre-war prices and also in its relation to the maximum price levels attained by the industry during the war and the post-war period.

These price movements are very clearly set forth in the accompanying chart. They are based on two-phase and three-phase squirrel-cage motors without auxiliary devices, ranging in size from 1 hp. to 50 hp. It will be noted that the present market is approximately within 10 per cent of the pre-war market of 1914. The chart shows that the maximum advance during the war and post-war periods of the motor market occurred in August, 1920, when prices were approximately 50 per cent above pre-war prices.

As an explanation of the present price situation of the motor industry, it is stated that while the motor market of the country during the last ten years has steadily expanded at a substantial pace, the production capacity of the country has grown at an even greater rate, resulting in a degree of competition not exceeded in any other large industry. The effect of this increase of productive capacity has been that during the present general trade revival the motor industry has not attained capacity production, but the various companies have been operating in their motor divisions variously between 50 and 70 per cent of capacity.

As the effects of increasing business become established, there will be steady growth in the employment of the productive motor-manufacturing capacity of the country. This will lead to the gradual elevation of motor prices to a level representing a fair relation of current prices to pre-war prices such as exists in other leading industries.

The Metal Market

COPPER weakened by another ¼ cent last week and is now obtainable at 14.37½ cents, delivered. Although first hands avoided naming that quotation in the first part of last week, they clearly intimated that they would do this by inviting offers from consumers when the 14.50-cent price was not accepted. Copper is suffering from the depression current in all metals. Only finished steel is firm, although raw materials from which steel is made have been declining sharply of late.

Lead sales have been few and far between in the domestic markets during the last week. In the Middle West hardly enough business has been reported to establish prices, and consumers have been disconcerted by the rapid decline in New York.

NEW YORK METAL MARKET PRICES

	July 3, 1923 Cents per Pound	July 10, 1923 Cents per Pound
Copper, electrolytic	15.00	14.37½
Lead, Am.S.& R.price	7.00	6.85
Antimony	7.50	6.90
Nickel, ingot	27.00 to 32.00	27.00 to 32.00
Zinc, spot	5.80	5.76
Tin, Straits	41.00	38.40
Aluminum, 98 to 99 per cent	26.00	26.00 to 27.00

Comparative Prices of Station Supplies

	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars, per lb.	$0.034	$0.034	$0.0252
Cold finished shafting, per lb.	0.042	0.042	0.0335
Brass rods, per lb.	0.1825	0.1913	0.155
Solder (half and half), per lb.	0.2862	0.2812	0.21
Cotton waste, per lb.	0.1231	0.1231	0.101
Washers, cast iron (⅛-in.), per 100 lb.	4.66	4.66	3.83
Emery, disks, cloth, No. 1, 6-in. diameter, per 100	3.08	2.96	3.11
Machine oil, per gal.	0.349	0.349	0.34
Belting, leather, medium, off list	37%	37%	43%
Machine bolts, up to 1-in. x 30-in., off list	44½%	44½%	58%

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Chain Belt President Retires

William C. Frye, for seven years president of the Chain Belt Company, Milwaukee, manufacturer of chains for electric use, has retired from active participation in its affairs and has been succeeded by C. R. Messinger, vice-president and general manager since 1917.

Mr. Frye is retiring after an active association with the company for twenty-eight years. During this time he has occupied nearly all the important executive positions of the company.

National Lead Battery Company to Have Kansas City Plant

The National Lead Battery Company, St. Paul, manufacturer of batteries, is remodeling a factory building in the Blue Valley district in Kansas City and expects to start operations there in August. There will be employed in this plant about 150 persons, including salesmen and office force. It is said that the branches in New York, Dallas, Oakland and Atlanta will be supplied from the Kansas City factory. The Kansas City property has been occupied until recently by the Kansas City Bridge Company. The property includes about two and a half acres at Sixteenth Street and Manchester Avenue. G. P. Castner, vice-president, is in charge.

Electrical Sheet Appointment

William J. Woolridge on July 1 was appointed manager of the electrical sheet department of the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio.

Prior to this Mr. Woolridge was connected for about four years in the same capacity with the Whitaker-Glessner Company at Portsmouth, Ohio, resigning from there last May. For more than twenty-five years Mr. Woolridge was an electrical engineer with the General Electric Company, and during many of those years he specialized on electrical sheet-steel problems of all kinds.

Apex Electrical Distributing Has Tenth-Year Convention

The Apex Electrical Distributing Company, Cleveland, held its tenth-year convention in the first week of July, when 750 delegates from all parts of the United States met at the Hotel Cleveland to discuss production and merchandising problems of the company.

Signs in the convention headquarters stated that every minute of the convention was worth $222.22. This figure was arrived at by adding together the expenses involved in bringing the salesmen to the convention, together with a reasonable allowance for their time.

Western Electric Acquires More Space in Chicago

The Western Electric Company, Chicago, has leased two floors in the Wrigley Building, at Ashland Avenue and Thirty-fifth Street, totaling 22,500 sq.ft., and a floor in the Midland Building at 1500-24 South Western Avenue, approximating 30,000 sq.ft., and will take immediate possession for extensions. The space first noted will be equipped as supplementary works for the manufacture of telephone switchboard equipment, while the Midland Building property will be utilized for the present for warehousing service.

This is the first time in its history that the company has found it necessary to use property outside of its own plants for manufacturing purposes. The working force at the Hawthorne (Ill.) works has reached a maximum of 32,000 employees, as compared with 26,000 operatives about eight months ago.

Geier Ends Cleaner Contest

The P. A. Geier Company, Cleveland, announces that 149 of its salesmen won prizes of either cash or electric cleaners in the spring housecleaning contest just ended. The company in a statement points out that many others were aided by the spirit of the contest to increase their sales and commissions far above normal, although they did not win prizes. The first prize of $250 went to Harriman Eldridge, who sold the most of both machines and attachments.

Roberts Supply Opens Baltimore Branch Under J. F. Meyers

The H. C. Roberts Electrical Supply Company announces the opening of another supply house at 16 South Howard Street, Baltimore, with C. A. Williams in charge. This branch is under the general supervision of J. F. Meyers, who is also manager of the house in Washington.

The first general sales meeting of the Baltimore branch was held June 12, factory representatives being on hand to assist the organization in getting up speed. This is the fourth house now being operated by the Roberts company, the others being in Philadelphia, Syracuse and Washington.

Westinghouse Gets Contract for Largest Coal Hoist

The largest coal-mining hoist in the world will be installed at Orient No. 2 mine of the Chicago, Wilmington & Franklin Coal Company at West Frankfort, Ill. A contract for this hoist has been awarded to the Westinghouse Electric & Manufacturing Company and the Nordberg Manufacturing Company. The Westinghouse company will furnish the complete electrical equipment for the hoist.

The hoist contracted for will be twice as large as any coal-mining hoist in North America at the present time. The largest coal-mine hoist in North America now is equipped with a hoist motor having a capacity of 1,400 hp., and the capacity of the hoist motors of the Orient No. 2 hoist will be 4,400 hp., divided in two motors, one mounted at each end of the drum shaft and each having a capacity of 2,200 hp. at 40 deg. C. rise.

Diamond Power Specialty Firm Appoints More Representatives

The Diamond Power Specialty Corporation of Detroit has announced the appointment of Paul E. Theis as sales manager for the Cleveland district, with offices at 608 Rockefeller Building.

Burford, Hall & Smith, American Trust and Savings Bank Building, Birmingham, Ala., have been appointed district representatives for the sale of "Diamond" soot blowers by the Diamond Power Specialty Corporation.

The Boiler Equipment Service Company, Candler Building, Atlanta, is now selling "Diamond" soot blowers in the states of Georgia and Florida.

Carroll Electric Opens Branch Warehouse in Baltimore

The Carroll Electric Company, Inc., 714 Twelfth Street, N. W., Washington, D. C., jobber of electrical supplies and machinery, has opened a new branch warehouse at 38 South Calvert Street, Baltimore. This Baltimore branch of the company was established in May, 1923, when officials of the company purchased and absorbed the old Chesapeake Electric Company of that city. The Baltimore branch warehouse is in charge of T. Gant Hardesty, who for the last twenty years has been connected with the electrical supply business in that city.

Louis Carroll, sales director for the company, will make his headquarters at the Baltimore branch. This branch will cover Maryland, Virginia and Delaware and parts of Pennsylvania, West Virginia and North Carolina.

Officers of the company are: Harry R. Carroll, president; Louis D. Carroll, vice-president and director of sales, and Harry W. Clayton, secretary. The Carroll Electric Company was established in 1900. Another branch of this company is in Norfolk, Va.

Standard Turbine Corporation Buys Youngs Machine

The Standard Turbine Corporation, Wellsville, N. Y., which for some time has been engaged in the manufacture of steam turbines in capacities up to 750 hp., has just announced the purchase of the plant of the Charles Youngs Machine Company, Wellsville, where it is at the present time caring for the latter company's output.

A contract has been awarded to the Austin Company of Cleveland for the construction of a new steel building at Scio, N. Y., 4 miles from Wellsville, to be completed in August of this year. This will be the permanent location of the plant and the Youngs factory will be used only until the time this new building is completed. After that time the Youngs shop will be used for storage purposes by the comp ny.

The company reports increasing business. The Standard Turbine Corporation is managed by J. Y. Daalstrand, formerly chief engineer of the Carr Turbine Company of Wellsville and previously to that time connected in various engineering capacities with practically all of the turbine builders in this country.

G. E. Orders Gained 34 per Cent Over Like Period in 1922

Orders received by the General Electric Company for the three months ended June 30, 1923, were $84,249,710, an increase of 34 per cent over a similar period for last year, according to the quarterly report to stockholders signed by President Gerard Swope. For the six months ended June 30, 1923, orders totaled $164,263,755, or an increase of 44 per cent over a similar period of 1922.

J. F. Motz with Allen-Bradley

J. F. Motz has been appointed to succeed Gray E. Miller as district representative of the Allen-Bradley Company in the Pittsburgh territory. Mr. Motz will have charge of the entire line of Allen-Bradley equipment, including industrial-control equipment, starting equipment, mine-hoist control, etc., in the Pittsburgh territory.

Vrabeck & Kessler Appointed Champion Engineering Agents

Vrabeck & Kessler, engineers, 149 Broadway, New York City, have been appointed New York district representatives of the Champion Engineering Company, Kenton, Ohio, builder of electric traveling cranes, sluicegates, penstocks, automobile turntables and hydraulic machinery. J. W. Spensley, representative of the Champion company in New York for a number of years, recently resigned to devote more time to sales of domestic and industrial oil burners with the Brooklyn Oil Burner Company, Brooklyn, of which he was an organizer.

J. S. Vrabeck was sales manager of the Sturtevant Mill Company, Chicago, for seven years and prior to that with the sales staff of the Allis-Chalmers Manufacturing Company. H. H. Kessler was formerly with the Atlas-Portland Cement Company and later with the Hardinge Conical Mill Company.

Howell Motors Election

At a recent meeting of the board of directors of the Howell Electric Motors Company, Howell, Mich., the following officers were elected for the ensuing year: W. M. Spencer, president and treasurer; R. B. McPherson, vice-president; C. F. Norton, vice-president and general manager, and H. T. Proctor, secretary and assistant treasurer.

New Company Acquires Electric Steel Box Firm

The Electric Box & Switchboard Company, Inc., 564 West Monroe Street, Chicago, recently organized, has taken over the business of the Electric Steel Box Company and added a switchboard department. The company now manufactures steel boxes for electrical work, switchboards and panelboards. Officers are: H. L. Johnson, president; E. J. Lang, vice-president, and George Meyer, Jr., secretary-treasurer.

Bliss to Sell Old Plant

Following the removal of its plant at the foot of Sands Street, Brooklyn, to its new location for the concentration of production, the E. W. Bliss Company, manufacturer of electrically driven machinery, will discontinue all operations at the previous works and the property will be placed on the market. It consists of a number of buildings, totaling 200,000 sq.ft.

Weeks-Merit System, Inc., Is Successor to S. S. Weeks

The Weeks-Merit-System, Inc., 228 Aborn Street, Providence, R. I., has been incorporated as successor to S. S. Weeks, who for the past four years has represented the Associated Engineering & Supply Company of San Francisco as Eastern distributor of the Merit automatic oil stoking system.

Mr. Weeks will be president of the new corporation. The company is now manufacturing "Merit System" devices of new design only, the standard design being furnished for the present by the Westinghouse Pacific Coast Brake Company.

The new company is enlarging its machine shop and eventually will manufacture all apparatus sold in this territory. The company can furnish automatic fire and draft control for any make or type of oil burner with any type of boiler with either natural or forced draft. It also has an automatic control for pulverized-coal-burning boilers.

Lance Enters Supply Field

The Lance Electrical Supply Company, St. Louis, organized and headed by S. Carl Lance as president, formally announced its recent entrance into the field by a reception held at its office and warehouse at 1016-18 Market Street. Mr. Lance has been identified with the electrical industry for many years, his latest former connection being with Brown & Hall Supply Company, where he served as vice-president and general manager, resigning that office to engage in business on his own account.

Sprague Conduit Products Will Move to Bridgeport, Conn.

The Sprague Conduit Products Section of the General Electric Company will leave the building at 527 West Thirty-fourth Street, New York City, which it has occupied for a quarter century in the manufacture and selling of conduit and other products, and remove to Bridgeport, Conn., on Aug. 1. This move is in keeping with the policies of the merchandise department.

The following men are in charge of the conduit products section: A. J. Young, Jr., J. R. Whittle, L. D. Vanderbleek, O. F. Kypta and H. L. Mulligan.

The Mule Battery Manufacturing Company, care of Albert Setzer, 153 Wendell Street, Providence, R. I., recently organized, will manufacture electric storage batteries and equipment. The company is fully equipped to cope with present requirements, its only need being for raw materials.

The Combination Electric Switch Corporation, New York, has been incorporated with capital stock of $100,000 to manufacture electrical switches and parts. It is not yet permanently located, but the company expects to be in production in the near future. All manufacturing will be done by contract. Address care of P. A. Zizelman, 42 Broadway, New York City.

The American High Frequency Corporation, New York, has been incorporated with capital stock of $500,000 to manufacture electrical machinery. Plans are not yet definitely decided. Incorporators are V. Wirth, A. Weilich and A. J. Armore; address, 128 Broadway, New York City.

The American Electric Company, electric jobber of supplies, fixtures and construction material, St. Joseph, Mo., announces the appointment of C. I. Echols, formerly with the Electric Appliance Company, Dallas, Tex., as sales manager. He succeeds Robert A. Graham.

The H. S. Whiting Company, Inc., manufacturer and distributor of lighting units, Grand Central Terminal Building, New York City, has completed the Joseph Horne Company's department store (Pittsburgh) lighting contract.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

An agency is desired in Madrid, Spain (No. 7,092), for generators, transformers and electric stoves and fans.

Purchase is desired in Madras, India (No. 7,113), for electrical apparatus for private hydro-electric plant to operate under a 60-ft. head.

An agency is desired in São Paulo, Brazil (No. 7,196), for motors and wiring supplies.

An exclusive agency is desired in Johannesburg, South Africa (No. 7,091), for radio sets, parts and accessories.

ELECTRICAL APPARATUS FOR AUSTRALIA.—Tenders will be received by the State Electricity Commission of Victoria, Melbourne, Australia, until Oct. 6, for 2,000 disk-tensioning insulators and 6,000 pin-type supporting insulators for 22,000-volt circuits.

EQUIPMENT FOR ELECTRIC PLANT FOR DURBAN, SOUTH AFRICA.—Tenders will be received by the Municipal Council of Durban, South Africa, until Aug. 31 for equipment for power plant in connection with the water project at Shongwani, including oil or gas engines, generators, cable ways, electric cranes, motors, etc.

ELECTRIC CAPSTANS FOR CHRISTCHURCH, NEW ZEALAND.—The purchase of twenty-five electric capstans, to cost £18,750, has been decided upon by the Harbor Board of Christchurch, New Zealand.

PROPOSED HYDRO-ELECTRIC DEVELOPMENT IN THE NORTHWEST TERRITORY AUSTRALIA.—Certain water rights have been granted, provisionally, by Sir James Mitchell, Premier of Western Australia, to the Yampi Sound Electrical Power & Smelting Syndicate, which proposes to develop electric power in connection with the development of the iron deposits at Yampi Sound, in the Northwest Territory.

PROPOSED HYDRO-ELECTRIC POWER STATION NEAR DAHLEN, LATVIA.—Plans are under consideration for the erection of a hydro-electric plant near Dahlen, to cost with construction of a canal about one million Latvian rubles. The government and the municipality of Riga have agreed to undertake the work jointly. The work will be finished in about three years.

ELECTRIFICATION OF RAILWAYS IN DUTCH EAST INDIES.—Work will begin on the electrification of one important main line in the Dutch East Indies, according to *Commerce Reports*, as soon as financial conditions are more favorable. Electrification of other lines will depend upon the results achieved in the way of reduction of operating costs and increased returns as compared with the old system.

New Apparatus and Publications

PORCELAIN BUSHINGS.—The Lapp Insulator Company, Inc., Le Roy, N. Y., is distributing bulletin No. 104, covering the "Lapp" porcelain bushings for transformers, etc.

FIXTURE STRAP.—A fixture strap ("Adjustable") for ceiling collars and brackets, which is adjustable from 4 in. to 8 in., has been bought by the Tax-Kerns Company, 591 E. Water Street, Milwaukee.

ELECTRIC WASHER.—An electric clothes washer ("Incomparable Conlon") has been placed on the market by the Conlon Corporation, Chicago.

COMBINATION FAN AND HEATING UNIT.—The Stoughton Manufacturing Company, Stoughton, Wis., has developed a combination fan and heating unit.

ELECTRICAL SIGN.—A new electrical sign, known as the "Color-Volve" sign, has been devised by Fred T. Loftin, 58 When Building, Indianapolis, Ind.

AUTOMATIC MACHINERY, ELECTRIC FURNACES, ETC.—The General Engineering & Supply Company, 160 Fifth Avenue, New York City, is distributing sheets Nos. P-1, F-1, E-1, F-2 and B-1, covering its various products, including automatic punch press, electric furnaces, switchboard for multiple furnace control, etc.

METALLIC PACKING.—The Crane Packing Company, 1800 Cuyler Avenue, Chicago, is distributing a booklet describing the "John Crane" process of metallic packing, its development and correct application to surface condensers, heaters, evaporators and intercoolers.

CONTROL OF LIGHTING IN THEATERS.—The Frank Adams Electric Company, St. Louis, is distributing bulletin No. 28, describing and illustrating the "Major Pre-Selective" system of remote control of lighting in theaters. It also contains general specifications for the electric light and power wiring for theater buildings for the "Major" system.

ELECTRIC HEAT.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued the first number of a miniature publication entitled "Electric Heat." This publication, which will be issued frequently, will be devoted to industrial electric heating problems. This number contains articles on the use of electric heat in the manufacture of batteries, electric motors, etc.

STOKER.—The Sanford Riley Stoker Company, Worcester, Mass., is distributing publication No. 69, describing and illustrating the Jones "Lateral Retort" stoker.

WIRE.—The Copper Clad Steel Company, Braddock P. O., Rankin, Pa., is distributing a leaflet (revised) entitled "Technical Data and Tables on Aristos 'Copperweld' Signal-Line Wire."

MOTOR-GENERATOR.—The Acme Electric & Manufacturing Company, 1444 Hamilton Avenue, Cleveland, has developed a vertical constant-potential motor-generator. This machine is made in 100, 200 and 400-amp. sizes for various phases and voltages.

OIL CIRCUIT BREAKER.—A new oil circuit breaker, type F-33, in capacities of 400, 600 and 800 amp. at 15,000 volts, has been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

PANELBOARDS.—Bulletin No. 29 issued by the Frank Adam Electric Company, St. Louis, describes and illustrates the "P" type unit-constructed standardized panelboard. Separate bulletins have been issued by the company on the type "T-P" panelboard, which is the tumbler-switch plug-fuse panel of the "Triumph" line and on type "R" panelboard for residences and small stores.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

BANGOR, ME.—The trustees of the Eastern Maine General Hospital plan to construct a power house, to cost about $60,000. Haven & Hoyt, 220 Devonshire Street, Boston, are architects.

SPRINGFIELD, MASS.—The Springfield Power Association plans to build a new one-story power house on Lyman Street.

SPRINGFIELD, MASS.—A substation to distribute electricity in the East Springfield district is being erected by the United Electric Light Company on Page Boulevard. The cost is estimated at $36,000.

HARTFORD, CONN.—The Hartford Electric Light Company is planning to erect a one-story substation on Windsor Avenue.

MERIDEN, CONN.—The Connecticut Company has acquired a site on Capitol Avenue on which it will erect new carbarns and shops to replace a building destroyed by fire several months ago. The cost is estimated at about $150,000.

PLAINVILLE, CONN.—The Standard Steel & Bearings Company contemplates the construction of a transformer substation at its local plant.

Middle Atlantic States

ALBANY, N. Y.—Plans are being prepared by the Municipal Gas Company for an electric substation on Partridge Street, to cost about $35,000.

BROOKLYN, N. Y.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until July 24, for one motor-generator set for the local navy yard. (Schedule 1070.)

BROOKLYN, N. Y.—Electric equipment will be installed in the baking plant to be erected at 67-75 Mill Street, by the Larson Baking Company, 732 Henry Street, to cost $90,000. The McCormick Company, 41 Park Row, New York, is engineer.

DANSVILLE, N. Y.—The Hornell (N.Y.) Electric Company contemplates extensions to its local plant.

FLEISCHMANNS, N. Y.—The Fleischmanns Light, Heat & Power Corporation, recently organized, will operate a local power plant for commercial service. S. V. Ryan and G. S. Ortman are interested in the company. Frost, Watson & Sharp, Albany, are representatives.

HORNELL, N. Y.—The Hornell Electric Company contemplates extensions to its electric plants in Hornell and Dansville, N. Y., including the installation of new equipment.

NEW YORK, N. Y.—Power equipment, ovens, conveying machinery, etc., will be installed in the proposed new plant to be erected by the Gottfried Baking Company, 534 East Seventy-second Street, to cost about $100,000.

OLEAN, N. Y.—The Olean Electric Light & Power has applied to the Public Service Commission for authority to erect and operate a transmission line through Humphrey Township. The proposed line will connect the Olean company with the lines of the Niagara, Lockport & Ontario Power Company.

TULLY, N. Y.—The Syracuse (N. Y.) Lighting Company has petitioned the Public Service Commission for permission to operate an electric lighting system in Tully and the towns of Lafayette, Fabius and Tully. The village of Tully has voted to sell the municipal plant to the Syracuse company. If its plans are approved, the company plans to expend about $58,000 in making extensions and installing a distribution system in the new territory, which it will serve from the Syracuse plant.

ASBURY PARK, N. J.—A power plant will be installed in the new ten-story hotel to be erected by a local company, now forming, to cost $1,000,000, for which plans are being prepared by Warren & Wetmore, 16 East Forty-seventh Street, New York, architects.

BRANCHVILLE, N. J.—The property of the Branchville Electric Power, Water & Lighting Company has been acquired by the Culvers Hydro-Electric Company. The latter company has been granted permission to issue $90,000 in capital stock, part of the proceeds to be used for extensions, including the installation of additional equipment.

COLLINSWOOD, N. J.—The General Water Supply Company contemplates the installation of electrically operated pumps, to cost about $45,000.

PATERSON, N. J.—Manual training equipment will be installed in the proposed high school to be erected at Park Avenue and Market Street, at a cost of about $1,250,000. William T. Fanning, 5 Colt Street, is architect.

NEW HAVEN, PA.—The Metropolitan Edison Company has secured control of the York Haven Water & Power Company. Plans are being considered for extensions and improvements. The Metropolitan Edison Company is organizing five subsidiaries, to be known as the Pike, Alsac, District, Rockland and Ruscomb Manor Electric Companies, to purchase existing properties and install transmission lines.

OAKMONT, PA.—The Brady-Warner Coal Company, Brady, W. Va., will construct a substation at its local properties and install additional electrical and mechanical equipment for mining operations.

PITTSBURGH, PA.—The West Penn Power Company is arranging for a fund of $50,000,000 for extensions during the next twelve or more months. Plans are being perfected for transmission lines in Plum and Patton Townships, where rights-of-way have been secured. The following companies have been purchased: Fraser Township, Wayne Township, Karns City Borough, Bruin, Springdale, Queenstown and Cowanshannock Electric Corporations and the Wayne Township Light & Power Company. The properties will be consolidated and additional substations and transmission lines constructed.

YORK, PA.—The Pennsylvania Power & Light Company will build a transmission line from its plant at Holtwood to York and Coatesville.

CONOWINGO, MD.—The Susquehanna Power Company has secured permission from the Federal Power Commission to construct and operate a hydro-electric plant on the Susquehanna River, with ulti-

mate capacity of 360,000 hp., to cost about $20,000,000, with steel-tower transmission system.

ELKTON, MD. — The Eastern Power Company plans extensions to its power plant and transmission system in connection with the consolidation of electric properties at Elkton, Havre de Grace, North East, Aberdeen, Port Deposit and Rising Sun, Md., and Oxford, Pa., recently purchased.

HAMPTON ROADS, VA.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C. until July 17, for 1,795 pounds of magnet wire for the local navy yard. (Schedule 1083.)

LYNCHBURG, VA.—The Superior Anthracite Coal Corporation contemplates the installation of electric power equipment at its properties in the Brush Mountain section, Montgomery County.

NORFOLK, VA.—Plans are under way for the installation of an ornamental lighting system on Granby, Main and Church Streets, to cost about $20,000.

NORFOLK, VA.—The Ford Motor Company, Highland Park, Mich., contemplates the construction of a power house at its proposed local assembling plant to be erected on a branch of the Elizabeth River, to cost about $150,000.

PORTSMOUTH, VA.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until July 17, for a miscellaneous quantity of ammeters and voltmeters for the local navy yard. (Schedule 1085.)

WASHINGTON, D. C.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, until July 24, for 70,000 ft. of electric cable. (Schedule 1086.)

North Central States

BATTLE CREEK, MICH.—The Consumers' Power Company, Jackson, has acquired the local system of the Citizens' Electric Company. The property will be consolidated and extensions made.

CALUMET, MICH.—The Arcadian Consolidated Mining Company will build a power house at its properties to replace a plant recently destroyed by fire.

IRON MOUNTAIN, MICH.—The Michigan Iron Land & Lumber Company contemplates erecting 2 miles of high-tension transmission line from here to its factory on the Menominee River, to cost about $25,000. Mead & Seastone, Journal Building, Madison, Wis., are engineers.

JACKSON, MICH. — The Consumers' Power Company has issued $3,500,000 in bonds, part of the proceeds to be used for extensions and improvements.

LANSING, MICH. — The Lindell Drop Forge Company plans to construct a power house at its proposed local plant.

CLEVELAND, OHIO—Bids will be received by the commissioner of purchases and supplies until July 20 for lead-covered cable for the division of light and power.

CENTRAL CITY, KY.—The Illinois Central Railroad Company, Chicago, will build a power house in connection with additions to its local car and locomotive shops, to cost about $375,000. F. L. Thompson is chief engineer.

LOUISVILLE, KY. — Electric power equipment will be installed in the proposed local refining plant of the Louisville Petroleum Refining Company, Inter-Southern Building, to cost about $250,000. W. M. Mitchell is in charge.

FRANKLIN, IND.—The Interstate Public Service Company will make extensions and improvements in its local electric distributing system.

HAMMOND, IND.—The Northern Indiana Gas & Electric Company contemplates extensions and improvements to cost about $500,000, one-half of the appropriation to be used this year and the other half during 1924.

INDIANAPOLIS, IND.—The Terre Haute, Indianapolis & Eastern Traction Company is preparing plans for the construction of an addition to its power plant on West Tenth Street.

SHELBYVILLE, IND. — Clarence C. Shipp, head of Shipp & Company, Indianapolis, manufacturers of mechanical apparatus, has acquired a power site and plant at Flatrock Mill, near Shelbyville, which it will utilize for a hydro-electric station. The cost is estimated at $125,000.

CHICAGO, ILL. — Gubinsky Brothers, Inc., 2261 South Union Avenue, will build a power plant in connection with a new paper mill at California Avenue and Thirty-first Street, to cost about $2,500,000. A. Epstein, 2001 Pershing Road, is architect and engineer.

CUBA CITY, WIS. — The Connecting Link Mining Company is asking for bids for the construction and equipment of a new milling and mining plant and power house, to cost about $25,000.

CUMBERLAND, WIS.—The local substation of the Wisconsin Hydro-Electric Company, Amery, was recently destroyed by fire. The station will be rebuilt.

LADYSMITH, WIS.—Plans are under consideration by the Hintz Brothers Company for equipping its new sawmill for electrical operation. Electricity will be supplied by the Lake Superior District Power Company.

MADISON, WIS.—The Chicago & North Western Railroad Company, it is reported, contemplates improvements to its local terminal, to cost about $500,000. The work will include a machine shop, 500 hp. steam generating plant, cinder pit with an electric hoist, new roundhouse, turntable, coal house and water reservoir.

BLUFFTON, MINN. — The village officials have awarded a contract for the construction of an electric transmission line and distributing system.

FOSSTON, MINN.—The Midland Power Company is planning to extend its transmission line to connect with the lines of the Northern States Power Company in Terrebonne.

SUNRISE, MINN.—The Northern States Power Company, St. Paul, has acquired the plant of the Sunrise Milling & Electric Company.

THIEF RIVER FALLS, MINN.—Surveys are being made for a proposed water-power plant for the city, to cost about $200,000.

WINONA, MINN.—The State Board of Control, State House, St. Paul, will take bids at once for the construction of a power plant at the proposed local state institutional buildings, to cost about $575,000. C. H. Johnston, 615 Capitol Bank Building, St. Paul, is architect.

DES MOINES, IOWA.—The Council is considering the installation of an ornamental lighting system on High Street. Karl C. Kastberg is engineer.

OAKDALE, IOWA.—Extensions and improvements will be made to the power plant at the local State Sanitarium. H. F. Liebbe, State House, Des Moines, is state architect.

COLERIDGE, NEB.—At an election to be held July 17 the proposal to issue $24,000 in bonds for extensions and improvements to the municipal electric plant will be submitted to the voters.

Southern States

MARSHVILLE, N. C.—The Union Lumber Company plans to rebuild its mill and power house, recently damaged by fire, causing a loss of about $200,000.

WADESBORO, N. C.—The Wade Manufacturing Company plans to build a hydro-electric plant in connection with its proposed new textile mill, to cost about $1,000,000. A steam-operated power plant will also be installed. Robert & Company, Inc., Atlanta, are engineers.

MACON, GA.—The Clinchfield Portland Cement Company, Kingsport, Tenn., plans to construct a power plant at its proposed cement-manufacturing plant, to be built near Macon, to cost about $1,000,000.

MIAMI, FLA.—The Florida Nu-Tex Brick Company, Tampa, contemplates the construction of a power house in connection with its proposed local concrete-brick plant, to cost about $50,000.

BIRMINGHAM, ALA.—The DeBardeleben Coal Corporation, recently organized to take over and operate a number of interests in the Warrior coal field, contemplates the installation of electric power and mechanical equipment at the mines. A bond issue of $4,000,000 has been sold, part of the proceeds to be used for expansion.

CALERA, ALA. — The O'Neals Lime Works, Inc., Birmingham, will build a power house in connection with its proposed local plant, to cost about $500,000.

GADSDEN, ALA.—The Alabama Power Company will extend its transmission system about 10 miles to serve the Citico mining district.

TOWNLEY, ALA. — The Corona Coal Company contemplates the installation of electric power and mechanical equipment at its properties.

TUSCALOOSA, ALA. — The Alabama Power Company has been denied permission by the Public Service Commission to construct its proposed hydro-electric plant on the Warrior River. The project will be held in abeyance until a new site is selected.

LENOIR, TENN.—The property of the Lenoir Light & Power Company has been acquired by the Tennesee Electric Power Company, Chattanooga. Extensions and improvements, to cost about $25,000, are contemplated.

MARTIN, TENN.—Steps have been taken by the Chamber of Commerce for the installation of an ornamental lighting system.

MEMPHIS, TENN. — Plans are under way for the installation of an ornamental lighting system on South Second Street and in the downtown portion of Union Avenue.

TREZAVANT, TENN. — Bonds to the amount of $35,000 have been authorized for the installation of an electric plant and waterworks system.

VICKSBURG, MISS.—The City Council is considering the installation of several electrically operated pumping plants in connection with a land drainage and reclamation project on the water front. The Miller-Butterworth Company, Southern Trust Building, Little Rock, Ark., is engineer.

WAYNESBORO, MISS. — The Simpson County Lumber Company contemplates rebuilding its power house and mill, recently damaged by fire, causing a loss of about $60,000.

COTTER, ARK.—Hugh L. Cooper & Company, 101 Park Avenue, New York, consulting engineers, has taken an option on the property of the Dixie Power Company, and will commence preliminary surveys for a proposed hydro-electric power plant on the White River. The cost of the project is estimated at $10,000,000.

FORREST CITY, ARK. — The Forrest City Special Improvement District will build a one-story power plant, 56 ft. x 80 ft., for commercial service. F. J. Herring is engineer.

OKEMAH, OKLA.—The Okemah Gas & Electric Company, recently organized, plans to install and operate a local commercial system. A transmission line will be built. S. T. Palmer is head.

OKLAHOMA CITY, OKLA.—A two-story power house to cost $65,000 will be erected at the University Hospital. The State Board of Affairs, Capitol Building, is in charge. Layton, Smith & Forsyth, Southwest National Bank Building, are architects.

PANAMA, OKLA.—The Buck Creek Mine Company will electrify its coal mines in the Bedwell section. Electrical service will be furnished by the Oklahoma Gas & Electric Company.

BRYAN, TEX.—Plans to double the capacity of the municipal power plant are under consideration. E. E. McAdams is city manager.

CHILDRESS, TEX.—The Childress Light & Ice Company plans to build an addition to its power plant.

FORT WORTH, TEX.—The Fort Worth Power & Light Company has arranged to increase its capital from $5,189,600 to $6,024,500, part of the proceeds to be used for extensions and improvements.

CORSICANA, TEX. — The Humble Oil Company contemplates building an electrically operated pumping plant at its works in the Beaton section.

DALLAS, TEX. — The Dallas Railway Company contemplates extensions and improvements to its system, including power house, substations, etc., to cost about $1,800,000, during the next eighteen months.

DALLAS, TEX.—Bids, it is understood, will be asked at once by the Brown Cracker & Candy Company, McKinney and Jefferson Streets, for its proposed new plant, to cost about $1,000,000. The equipment will include power equipment, conveying and other machinery, ovens, etc. C. E. Barglebaugh & Company, Medical Art Building, are architects and engineers.

ELGIN, TEX.—The Elgin Ice & Cold Storage Company plans extensions and improvements to the plant of the Elgin Light & Power Company, recently acquired.

FORT WORTH, TEX.—Plans are under consideration for the installation of an ornamental lighting system on the Dallas-Fort Worth highway.

GEORGIANA, TEX.—Tentative plans are under consideration for the installation of a municipal electric light plant.

HUBBARD, TEX.—The City Council is considering the installation of electrically operated pumping machinery at the municipal waterworks, to cost about $55,000.

NEW BRAUNFELS, TEX.—The Landa Milling Company, recently incorporated, has taken over and will operate the local electric light and water plant. Harry Landa, New Braunfels, is interested in the company.

Pacific and Mountain States

ALGER, WASH.—The installation of an electric lighting system in Alger is under consideration. Post office address is Bellingham.

EVERETT, WASH.—Contract has been awarded by the Delta Electric Water Company for the construction of an 80-ft. dam at Pilchuck.

YAKIMA, WASH.—The installation of an ornamental lighting system to cost about $5,000, is under consideration.

PORTLAND, ORE.—The Grand Rapids (Mich.) Show Case Company has acquired property in the Brooklyn district, between Twenty-second and Twenty-sixth Streets, on which it will erect a plant, consisting of a main building, power house, machine shop, etc. The cost is estimated at about $150,000.

LOS ANGELES, CAL.—Ralph Bennett, Central Building, and associates have applied to the State Water Commission for permission to build a hydro-electric plant on Big Rock Creek, Los Angeles County, with initial capacity of 6,100 hp., to cost about $600,000.

OAKLAND, CAL.—The J. W. Murray Manufacturing Company, 1975 Clay Street, Detroit, contemplates the construction of a power house at its proposed local branch plant for the manufacture of automobile equipment, to cost about $250,000.

SACRAMENTO, CAL.—The Great Western Power Company will make extensions in its Brighton substation, including the installation of auto-transformers, etc.

SAN BERNARDINO, CAL.—Plans are being arranged for the installation of ornamental lighting system on several streets, to cost about $100,000. Bids will soon be asked for the proposed installation on Mount Vernon Avenue.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company plans to construct a substation on Minna Street, near Eighth Street, to cost about $40,000.

SAN LUIS OBISPO, CAL.—The Southern Pacific Railroad Company, San Francisco, plans to build a power plant at its local yards to cost about $55,000.

TURLOCK, CAL.—The Turlock Irrigation District is preparing plans for the installation of an electrical distributing system, to cost about $500,000.

BUTTE, MONT.—The Royal Development has filed an application for water rights for a proposed power development on James and Alpine Creeks.

EUREKA, NEV.—The Eureka Smelting Company contemplates the construction of a power house in connection with its proposed local smelting plant, to cost about $1,750,000.

Canada

PORT ALBERNI, B. C.—The installation of a new generator and Diesel oil engine at the municipal electric plant, to cost about $5,000, is under consideration by the Council.

ST. JOHN, N. B.—The New Brunswick Electric Power Commission is planning to make a survey and to prepare an estimate of cost of the proposed electric transmission line from the Aroostook power development, a distance of 39 miles, to serve the towns of Bath, Bristol, Stickney, Florenceville, Centreville and Woodstock.

NORTH BAY, ONT.—The Hydro-Electric Power Commission of Ontario, Toronto, is planning the development of the Bingham Chutes, to include two 450-kva. units; increasing the Nipissing power development by the installation of a 1,200-hp. unit and building a wood-stave pipe line; also to develop 4,000 hp. at Cox's Chutes and 1,000 hp. at Elliott's Chutes, both on South River, and installing a 600-hp. Diesel oil engine in North Bay plant for use during low-water periods. The cost of the work is estimated at $500,000. F. A. Gaby is chief engineer.

SCHUMACHER, ONT.—Extensions are under consideration at the McIntyre-Porcupine Mines, including sinking the main shaft to the depth of 5,000-ft., and building a new mill on another section of the mine. The equipment will include hoisting equipment, crushers, tube and ball mills, pumps, electric motors, etc.

Electrical Patents

Announced by U. S. Patent Office

(Issued June 19, 1923)

1,459,698. DEPOLARIZER; B. H. Teitelbaum, Brooklyn, N. Y. App. filed Dec. 2, 1919. Dry battery provided with depolarizing mixture of manganese dioxide.

1,459,709. MULTIPLEX SIGNALING; B. W. Kendall, New York, N. Y. App. filed Oct. 13, 1916. By means of modulated high-frequency carrier waves.

(Issued June 26, 1923)

15,636 (reissue). TELEPHONE SYSTEM; S. A. Beyland, Long Meadow, N. Y. App. filed June 23, 1915. Means for releasing ringing apparatus.

1,459,726. APPARATUS FOR AUTOMATICALLY STARTING ENGINES OF MOTOR VEHICLES; A. Goodheim, West Hoboken, N. J. App. filed July 15, 1920. Prevents stalling of engine.

1,459,730. OPERATING MECHANISM FOR REGISTERS; F. C. Harris, Chicago, Ill. App. filed Nov. 17, 1919. Notching mechanism.

1,459,756. ELECTRICAL CONTROLLING MECHANISM; H. E. Stahl, Trenton, N. J. App. filed Sept. 23, 1922. Control for automatically reversing motors.

1,459,769. REPEATER CIRCUITS; O. B. Jacobs, East Orange, N. J. App. filed May 17, 1919. Use of repeater for several circuits.

1,459,770. SYSTEM FOR TESTING LINE BALANCE; A. L. Jones, Asbury Park, N. J. App. filed Nov. 15, 1921. Between one telephone line and rest of network.

1,459,786. METHOD OF AND APPARATUS FOR ELECTRICAL COMMUNICATION; D. G. McCaa, Lancaster, Pa. App. filed Jan. 19, 1920. Radio transmission system claimed to eliminate static.

1,459,788. BRAKE FOR TRAMWAY AND RAILWAY ROLLING STOCK; A. W. Maley, West Bromwich, England. App. filed June 21, 1920. Regenerative braking system.

1,459,801. ELECTRIC FURNACE; E. L. Smalley, East Orange, N. J. App. filed Aug. 6, 1920. Supporting means for resistors.

1,459,824. ELECTROMAGNETIC DEVICE; W. H. D. Ford, Chicago, Ill. App. filed Nov. 6, 1920. Increasing time lag for slow-releasing relays.

1,459,829. WATERPROOF ELECTRIC HEATER AND ITS METHOD OF MANUFACTURE; L. P. Hynes, Albany, N. Y. App. filed Oct. 18, 1921. For heating gases or fluid.

1,459,830. LIFTING MAGNET; F. W. Jessop, Cleveland, Ohio. App. filed April 29, 1918. Of very rugged construction.

1,459,859. MECHANICAL SWITCHING SYSTEM; W. T. Powell, Rochester, N. Y. App. filed June 12, 1919. Slow-releasing relays eliminated from automatic telephone exchange.

1,459,860. AUTOMATIC TELEPHONE SYSTEM; W. T. Powell, Rochester, N. Y. App. filed July 15, 1919. Different classes of service for automatic exchange.

1,459,863. MEASURED-SERVICE TELEPHONE SYSTEM; F. M. Slough, Rochester, N. Y. App. filed March 25, 1918. Charging for calls according to time of day.

1,459,868. ELECTRIC STOVE; W. R. Williamson, Thayer, Mo. App. filed Oct. 10, 1921. Electric-steam boilers.

1,459,885. WELDING; C. A. Hadley, Bradford, England. App. filed Sept. 11, 1922. Machine for butt welding.

1,459,902. SEARCHLIGHT FOR THE GUIDANCE OR DETECTION OF AIRCRAFT; E. A. Sperry, Brooklyn, N. Y. App. filed April 19, 1918. Directing beam from distant point.

1,459,932. PROCESS OF HEAT TREATMENT; E. Stansfield, Ottawa, Ontario, Can. App. filed April 3, 1920. Obtaining by-products from coal, liquids, peat, etc.

1,459,967. REGULATING DEVICE; L. Arnold, Lynn, Mass. App. filed Nov. 19, 1917. Constant-current transformer.

1,459,970. METHOD OF AND APPARATUS FOR TESTING MAGNETIZABLE OBJECTS; C. W. Burrows, Washington, D. C. App. filed July 25, 1917. Determining hardness of metal by magnetic analysis.

1,459,988. TRANSFORMER INSTALLATION; W. A. Pressey, Pittsfield, Mass. App. filed Aug. 25, 1919. Special transformer construction for outdoor service.

1,460,000. PROTECTIVE DEVICE FOR POLYPHASE CIRCUITS; L. W. Thompson, Schenectady, N. Y. App. filed April 7, 1920. Relay to open switch when one phase is cut out.

1,460,002. FLASHLIGHT; A. Uran, New York, N. Y. App. filed Feb. 9, 1922. Self-contained generator.

1,460,010. ISOLATOR FOR BATTERY SEPARATORS; C. M. Angell, Chicago, Ill. App. filed May 26, 1922.

1,460,025. INSTANTANEOUS HEATER; C. D. McLean, Berlin, N. H. App. filed May 18, 1922. For house water service.

1,460,031. MOUNTING FOR SLIP RINGS OF DYNAMO-ELECTRIC MACHINES; E. Meyercordt, Locknitz, near Stettin, Germany. App. filed Sept. 9, 1920. Shrinking rings on jacket of micanite upon shaft.

1,460,034. TELEPHONE TRANSMITTER; R. L. Murray, Bushey Heath, England. App. filed Aug. 24, 1921. Type to be held against throat.

1,460,037. ROTATABLE CONNECTOR; I. Pierson, Wellsley, Mass. App. filed April 17, 1919. For telephone cords.

1,460,040. HUSK FOR ELECTRIC LIGHT FIXTURES; J. W. Schulze, Providence, R. I. App. filed Dec. 10, 1920.

1,460,048. ELECTRICAL HEATING ELEMENT; P. A. E. Armstrong, Loudonville, and R. P. DeVries, Newtonville, N. Y. App. filed July 29, 1921. Made of alloy steel.

1,460,060. ELECTRICAL FIXTURE; M. Guett, Hartford, Conn. App. filed Sept. 30, 1920. Plug and receptacle used for fastening.

1,460,062. MOTOR CONTROL SYSTEM; B. W. Jones, Schenectady, N. Y. App. filed Jan. 26, 1920. Control apparatus for hoisting motors.

1,460,072. STORAGE BATTERY; J. D. Mintz, New York, N. Y. App. filed Oct. 11, 1922. Special arrangement for removing sediment.

1,460,083. RECORDING SIGNAL; E. Thomson, Swampscott, Mass. App. filed Dec. 27, 1921. For recording telegraphic or radio signals.

1,460,095. CIGAR LIGHTER; C. H. Cuno, Meriden, Conn. App. filed Sept. 13, 1922. Electric element.

1,460,104. ELECTROLYTIC RECTIFIER; R. W. McClintock and D. McKinnon, Toronto, Ontario, Can. App. filed Aug. 13, 1920. Device for remagnetizing magneto magnets.

1,460,106. ELECTRIC FURNACE MELTING OF MANGANESE SCRAP; W. G. Nichols, Chicago, Ill. App. filed Oct. 27, 1921.

1,460,137. METHOD OF PLATING METALS; H. A. Myers, Toledo, Ohio. App. filed March 6, 1922. Plating bodies by melting and welding coating metal to surface.

1,460,140. ELECTRIC COOKING DEVICE; M. E. Penso, New York, N. Y. App. filed Aug. 9, 1921. Combined electric oven and toaster.

1,460,143. INCANDESCENT LAMP; L. Ryzowicz and J. J. Bolek, Cleveland, Ohio. App. filed Aug. 6, 1920. Two filaments, used one at a time.

1,460,146. DEVICE FOR AIR-COOLING DUSTPROOF FAN MOTORS; M. H. Spielman, Cleveland, Ohio. App. filed Feb. 8, 1918. Auxiliary fan or shaft forces air from main intake through motor.

1,460,149 FLASHLIGHT; E. R. Barany, Brooklyn, N. Y. App. filed July 8, 1922. Three bulbs with switch for each.

1,460,150. FLASHLIGHT-BATTERY THRUST CAP; E. R. Barany, Brooklyn, N. Y. App. filed Aug. 14, 1922. To hold battery against bulb.

1,460,152. BRUSH HOLDER; J. S. Dean, Edgewood Park, Pa. App. filed Sept. 24, 1920. Yieldable holder takes up variable cross-section of brush.

1,460,153. CHOKE COIL; G. C. Dill, Wilkinsburg, Pa. App. filed Nov. 6, 1919. Each coil held rigidly by framework.

1,460,156. AUTOMATIC SUBSTATION; F. C. Hanker, Wilkinsburg, Pa. App. filed April 9, 1918. Automatic control apparatus for convertors.

1,460,157. MOTOR CONTROL SYSTEM; R. E. Hellmund, Swissvale, Pa. App. filed Oct. 8, 1918. Starting motor on low-voltage and switching to full voltage without opening motor circuit.

1,460,158. BRUSH HOLDER; R. E. Hellmund, Swissvale, Pa. App. filed July 30, 1920. Brush holder will flash over barriers for railway motors.

1,460,161. REGULATOR SYSTEM; E. Lehr, Wilkinsburg, Pa. App. filed May 28, 1919. For governing voltages on feeder circuits.

1,460,180. PROCESS FOR CONVERTING THE CARBONATES OR SULPHIDES OF BARIUM OR STRONTIUM INTO THE CORRESPONDING HYDRATES; R. W. Shafor, Denver, Col. App. filed Aug. 27, 1920. Partly by electrolysis.

1,460,190. SYSTEM OF CONTROL; O. Wortman, Audubon, N. J. App. filed Sept. 23, 1921. Control system for railway motors.

1,460,213. SYSTEM OF ELECTRICAL DISTRIBUTION; G. H. Roosevelt, Schenectady, N. Y. App. filed April 8, 1922. Protection of generators against continuous overload.

1,460,239. SLIDER FOR TUNING COILS; W. F. Gehrig, Newark, N. J. App. filed April 4, 1922.